

Fig.1

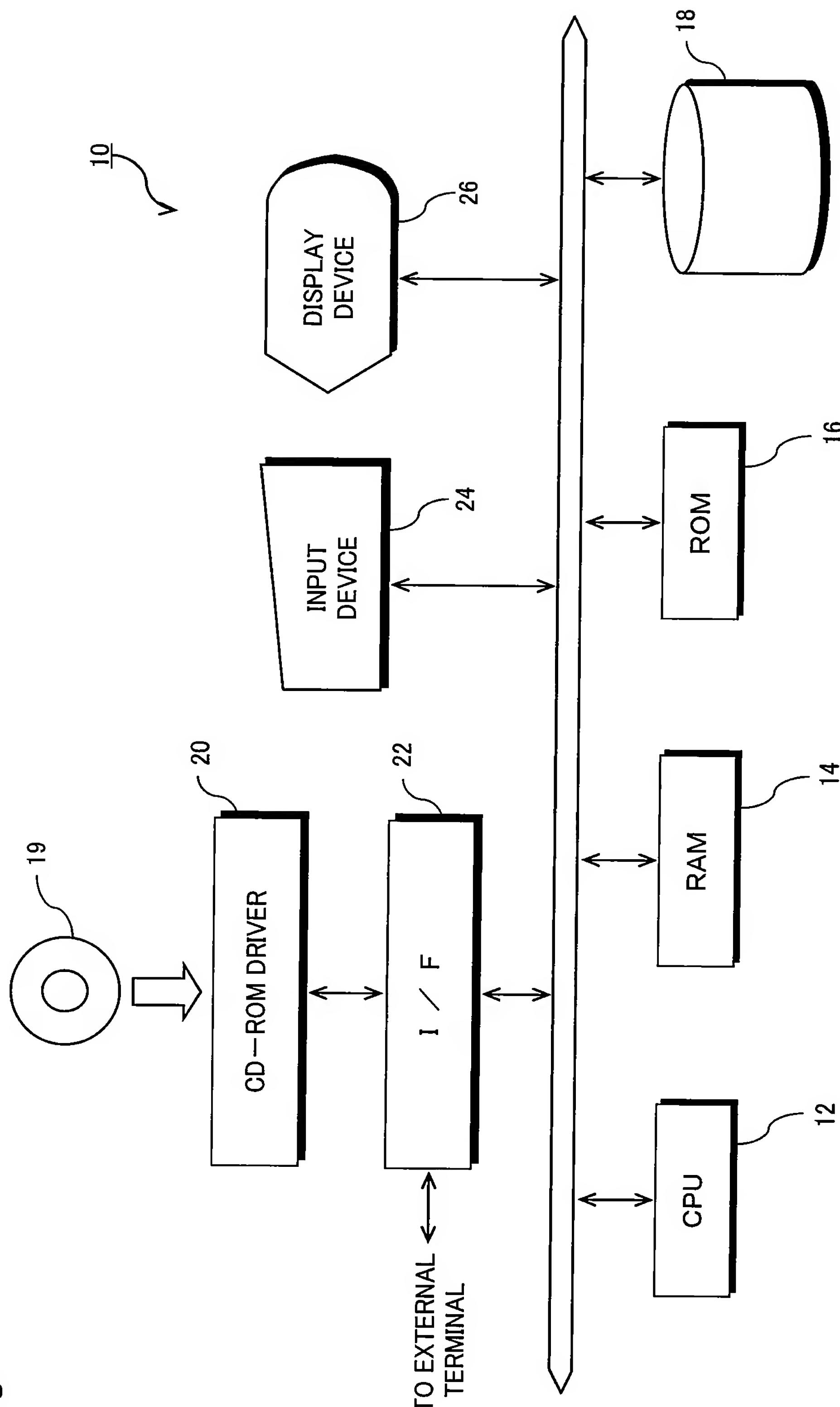


Fig.2A

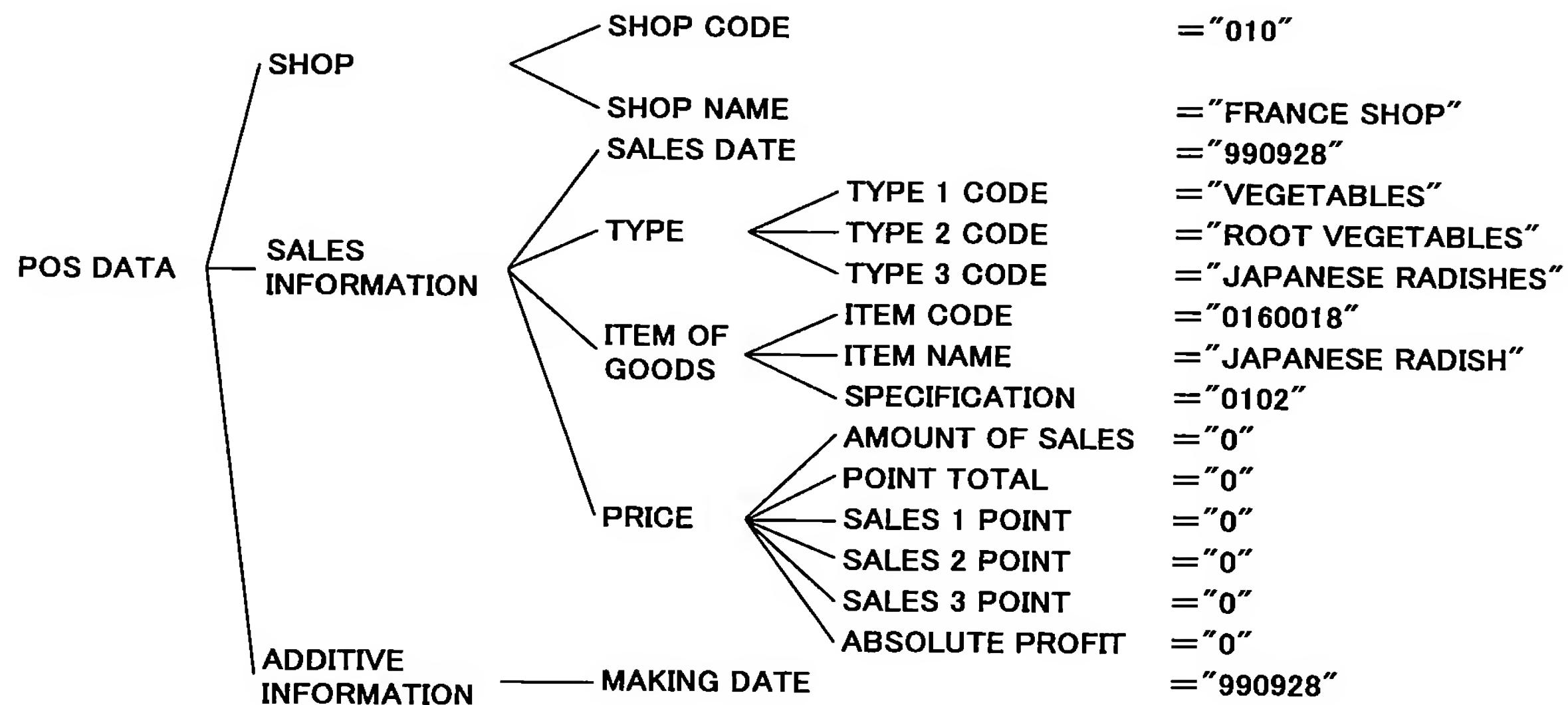


Fig.2B

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<posdata>
  <shop>
    <shopCode>010</shopCode>
    <shopName>FRANCE SHOP</shopName>
  </shop>
  <salesInformation>
    <sellDate>990928</sellDate>
    <class>
      <class1 code="01">VEGETABLES</class1>
      <class2 code="01">ROOT VEGETABLES</class2>
      <class3 code="01">JAPANESE RADISHES</class3>
    </class>
    <goods>
      <goodsCode>"0160018"</goodsCode>
      <goodsName>JAPANESE RADISH</goodsName>
      <standard>0102</standard>
    </goods>
    <price>
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      <sales3 point="0">0</sales3>
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    </price>
  </salesInformation>
  <additionalInformation>
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</posdata>
  
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Fig.3A

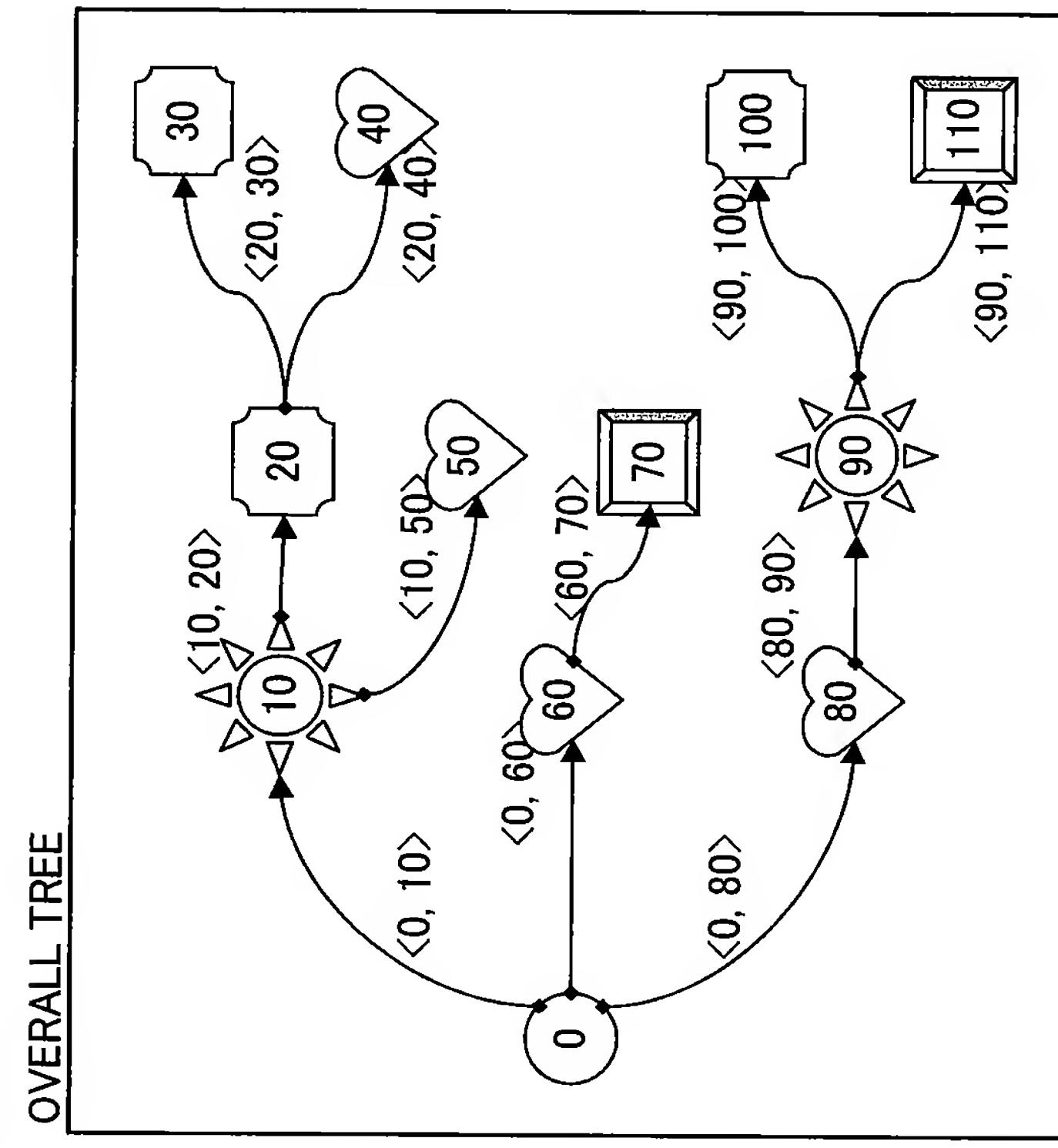


Fig.3B

ARC LIST	
From-ID	To-ID
0	10
1	60
2	80
3	10
4	10
5	20
6	20
7	40
8	80
9	90
10	100
11	110

Fig.3C

NODE LIST	
ID	Type
0	Root
1	Sun
2	Sqr
3	Sqr
4	Heart
5	Heart
6	Heart
7	Btn
8	Heart
9	Sun
10	Sqr
11	Btn

Fig.4A

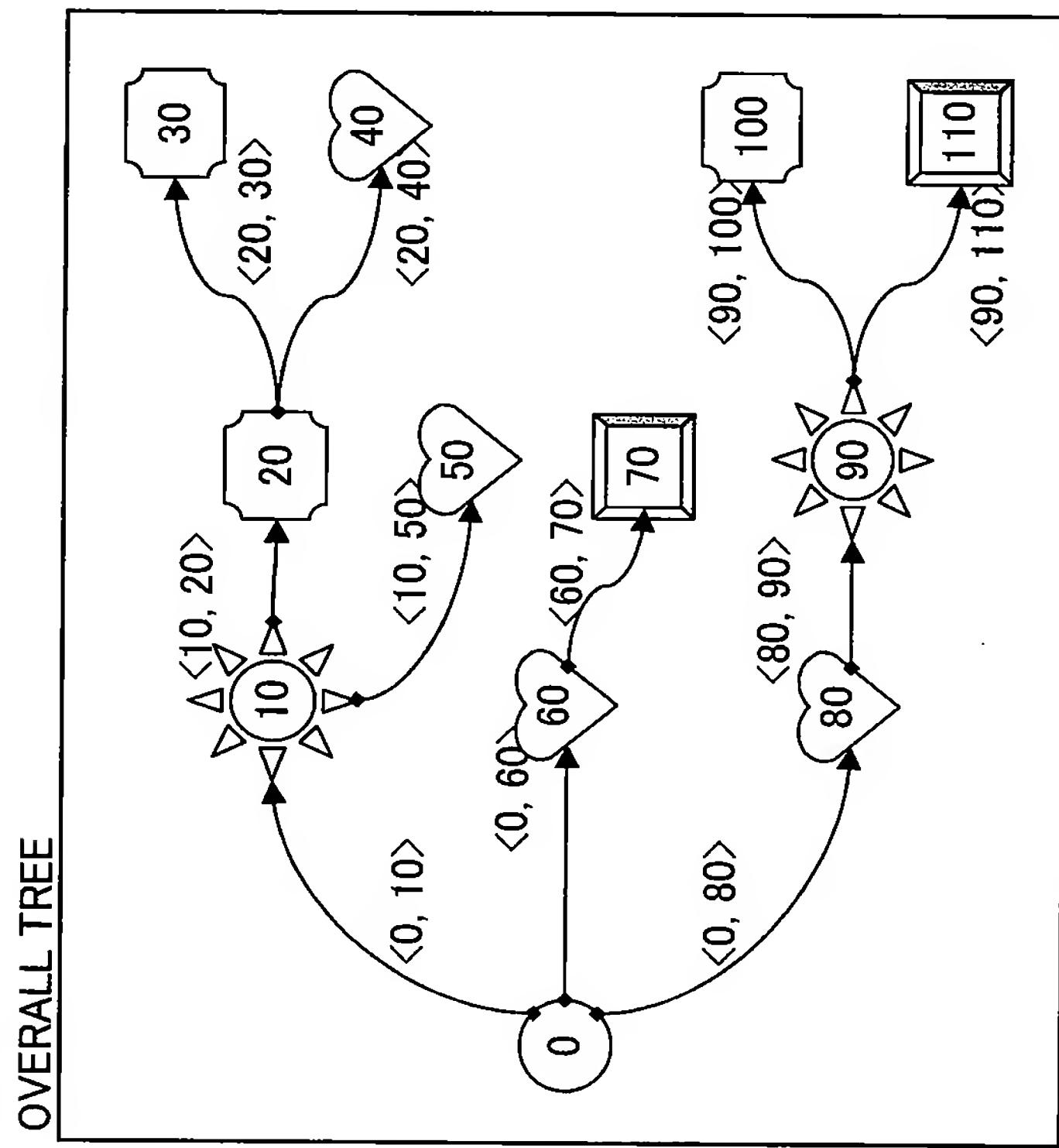


Fig.4B

ARC LIST:
"CHILD→PARENT"
RELATIONSHIP

To-ID	From-ID
0	-
10	0
20	10
30	20
40	20
50	10
60	0
70	60
80	0
90	80
100	90
110	90

Fig.4C

ARC LIST:
"CHILD→PARENT"
RELATIONSHIP

To-ID	From-ID
10	0
20	10
30	20
40	20
50	10
60	0
70	60
80	0
90	80
100	90
110	90

Fig.5

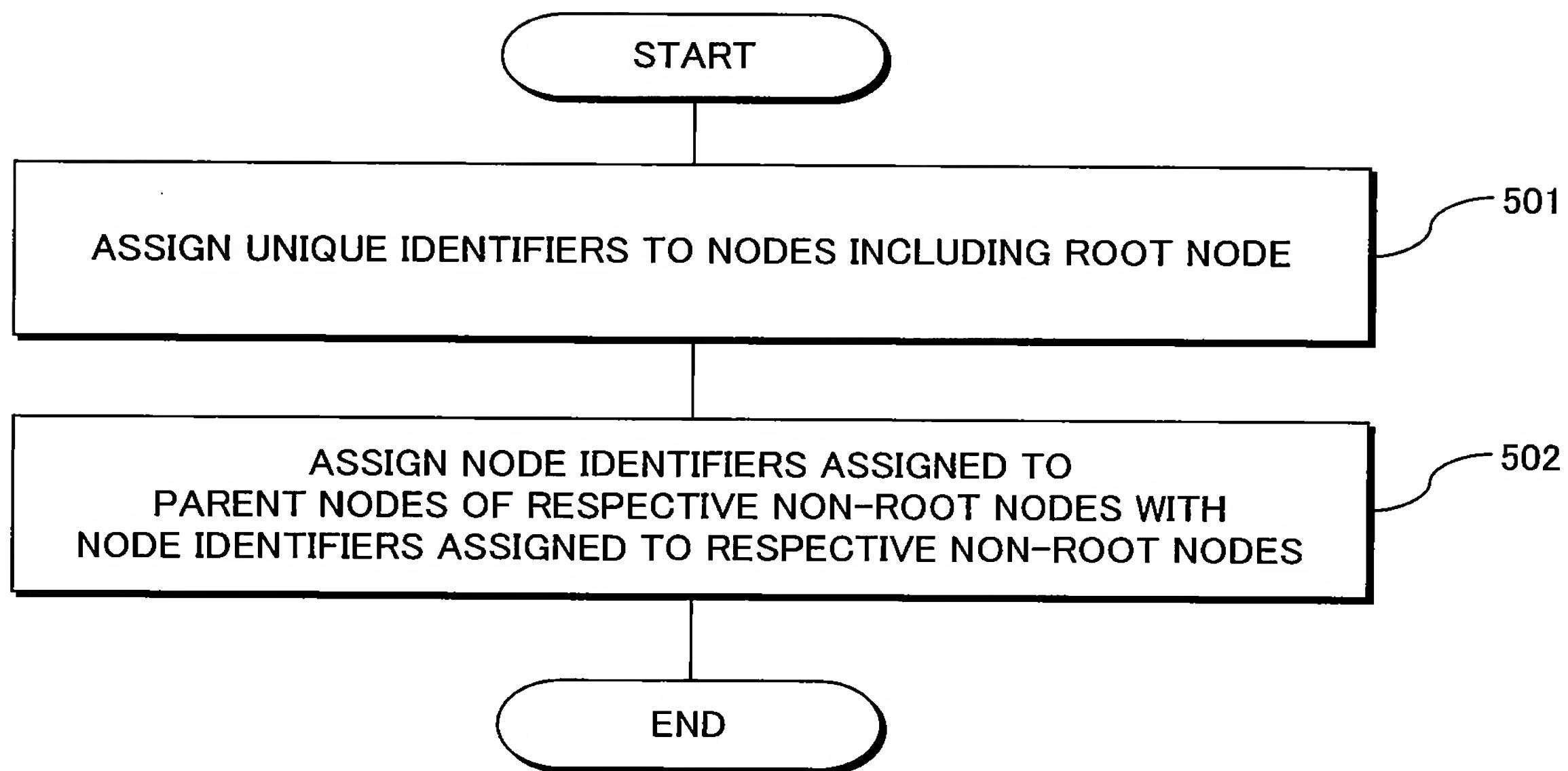


Fig.6A
DESCRIPTION BASED ON ID

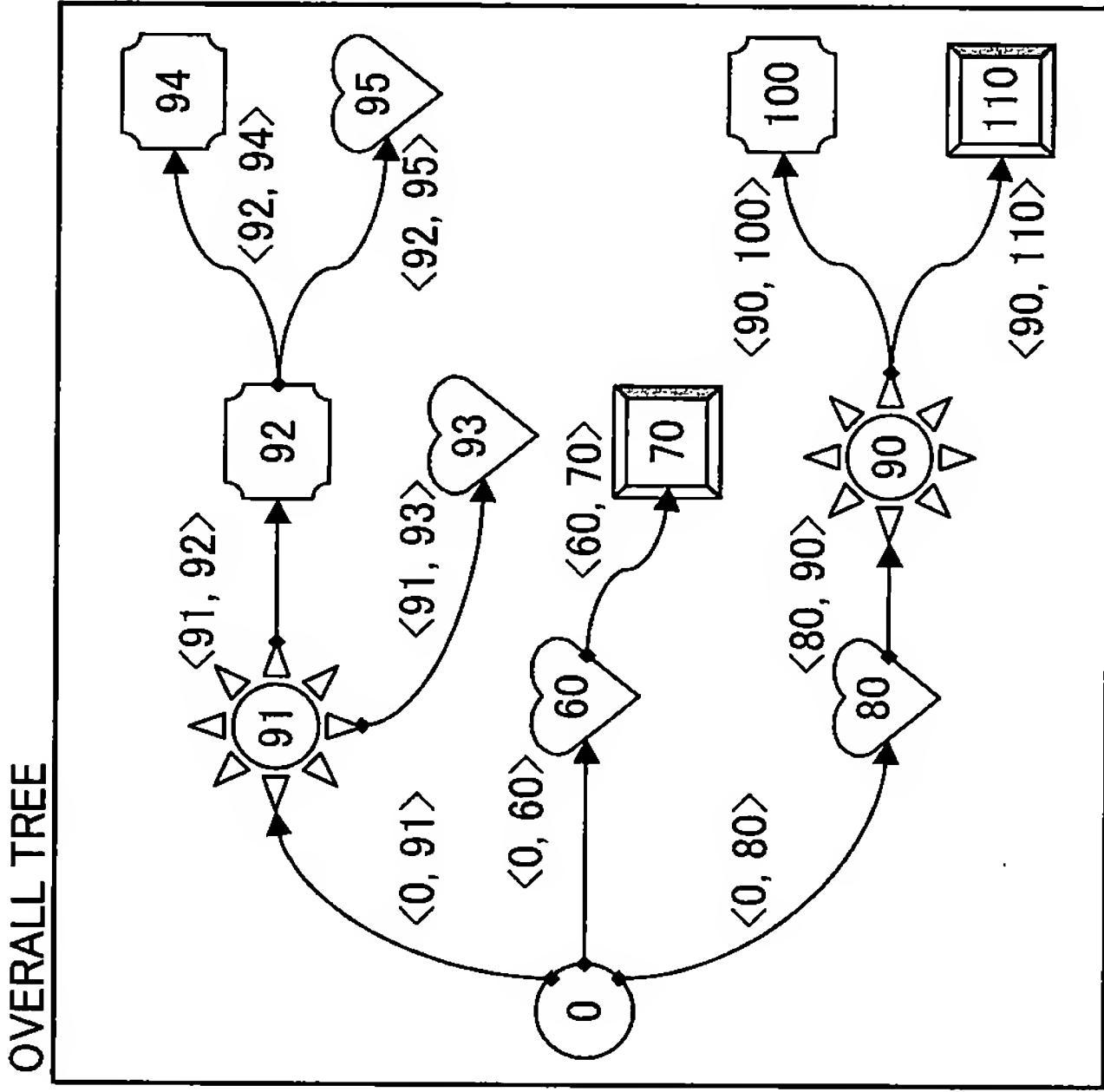


Fig.6B

ID->No. CONVERSION TABLE	
0	→ 0
91	→ 1
92	→ 2
93	→ 3
94	→ 4
95	→ 5
60	→ 6
70	→ 7
80	→ 8
90	→ 9
100	→ 10
110	→ 11

Fig.6C

DESCRIPTION BASED ON No. (DEPTH-FIRST)

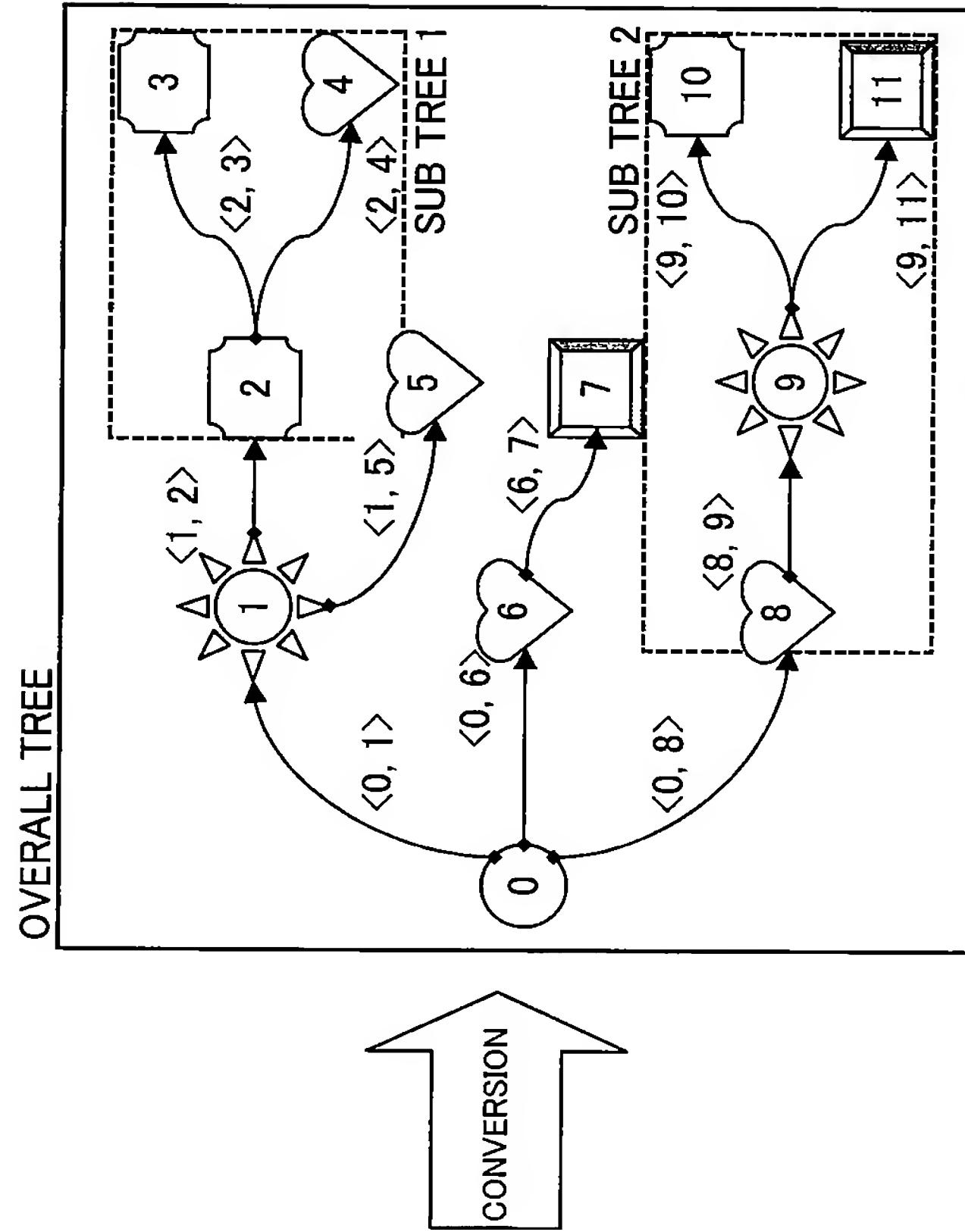


Fig. 7A
DESCRIPTION BASED ON ID

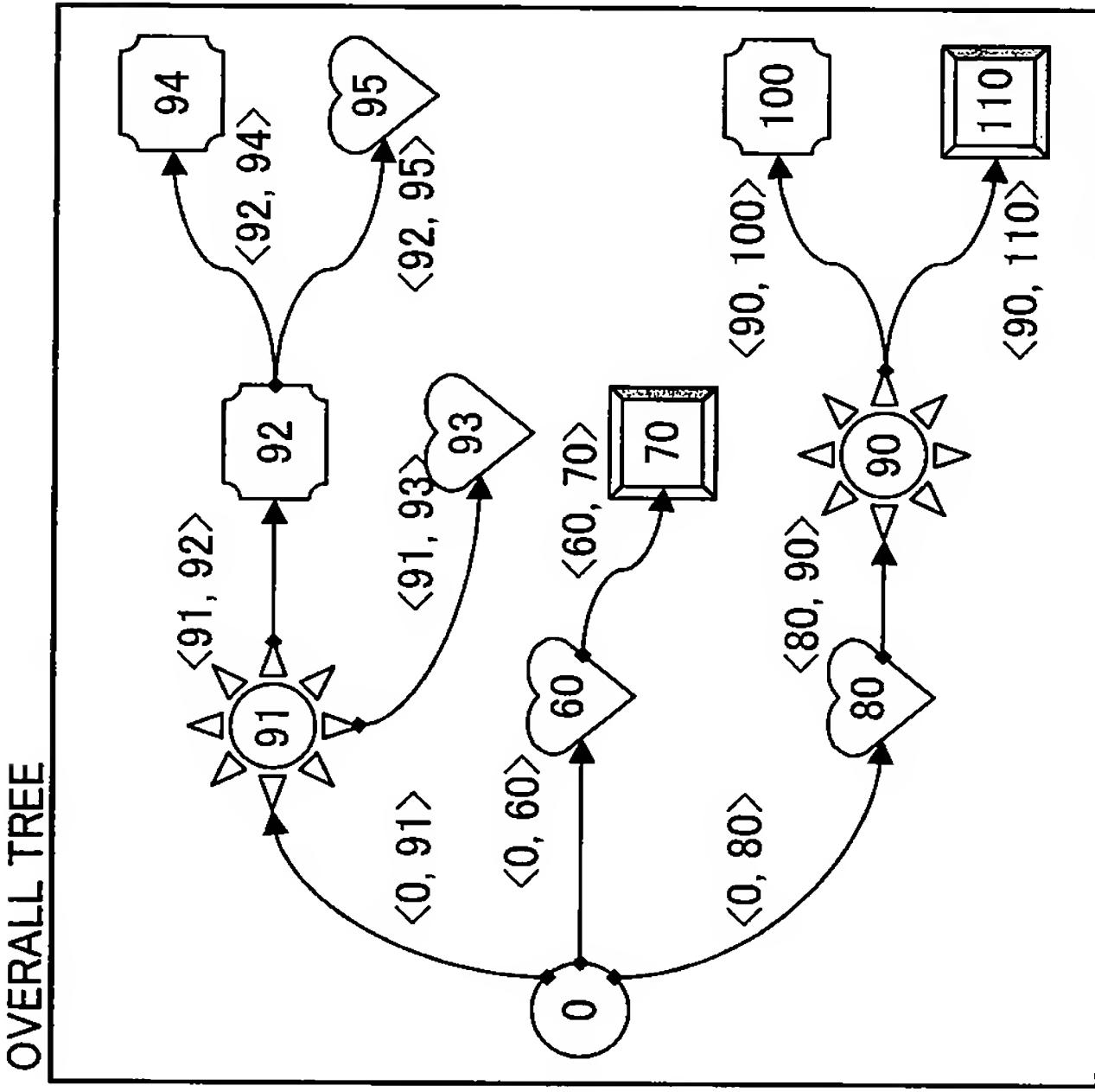
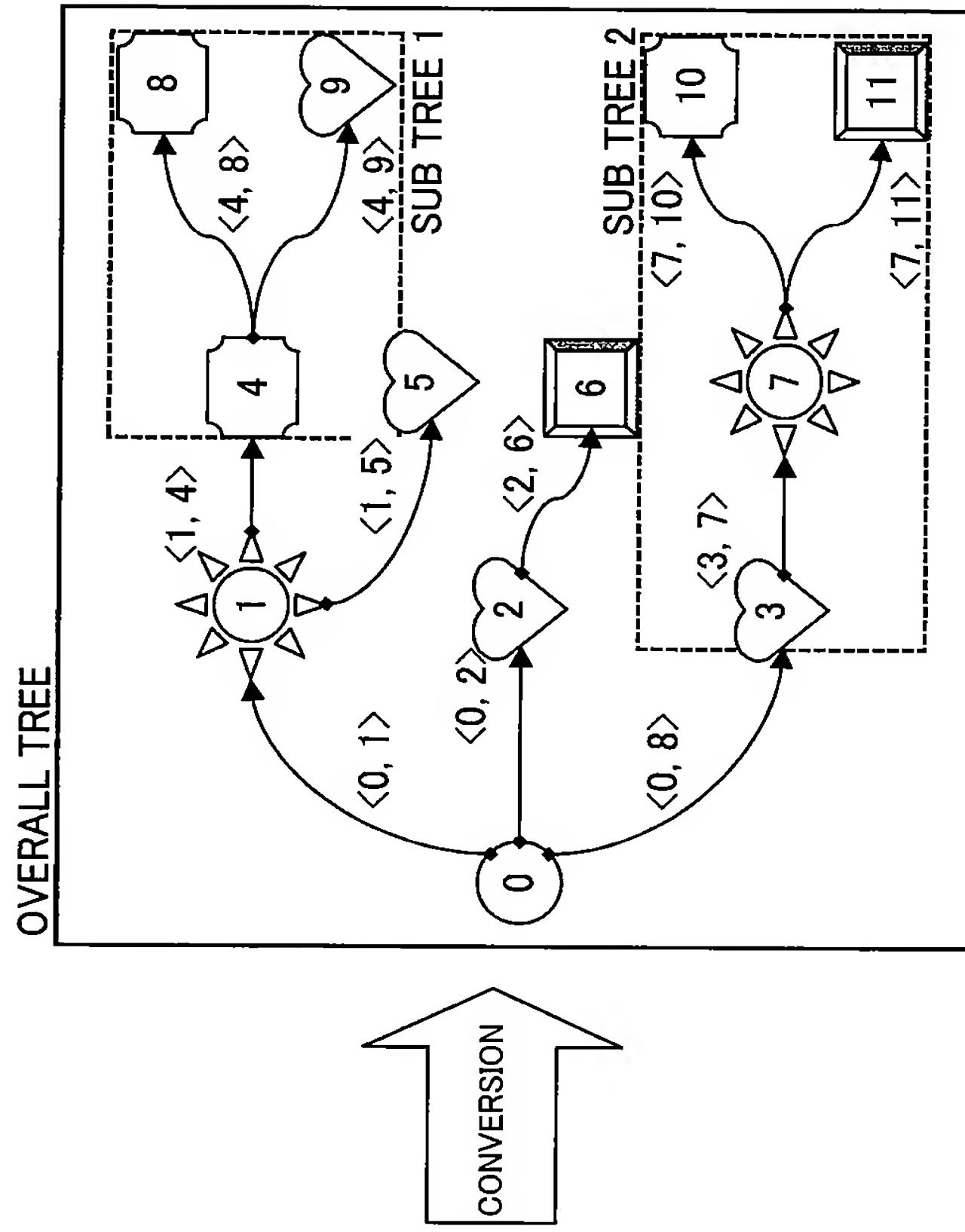


Fig. 7B

ID->No. CONVERSION TABLE	
0	→ 0
91	→ 1
92	→ 4
93	→ 5
94	→ 8
95	→ 9
60	→ 2
70	→ 6
80	→ 3
90	→ 7
100	→ 10
110	→ 11

Fig. 7C

DESCRIPTION BASED ON No. (WIDTH-FIRST)



CONVERSION

Fig.8

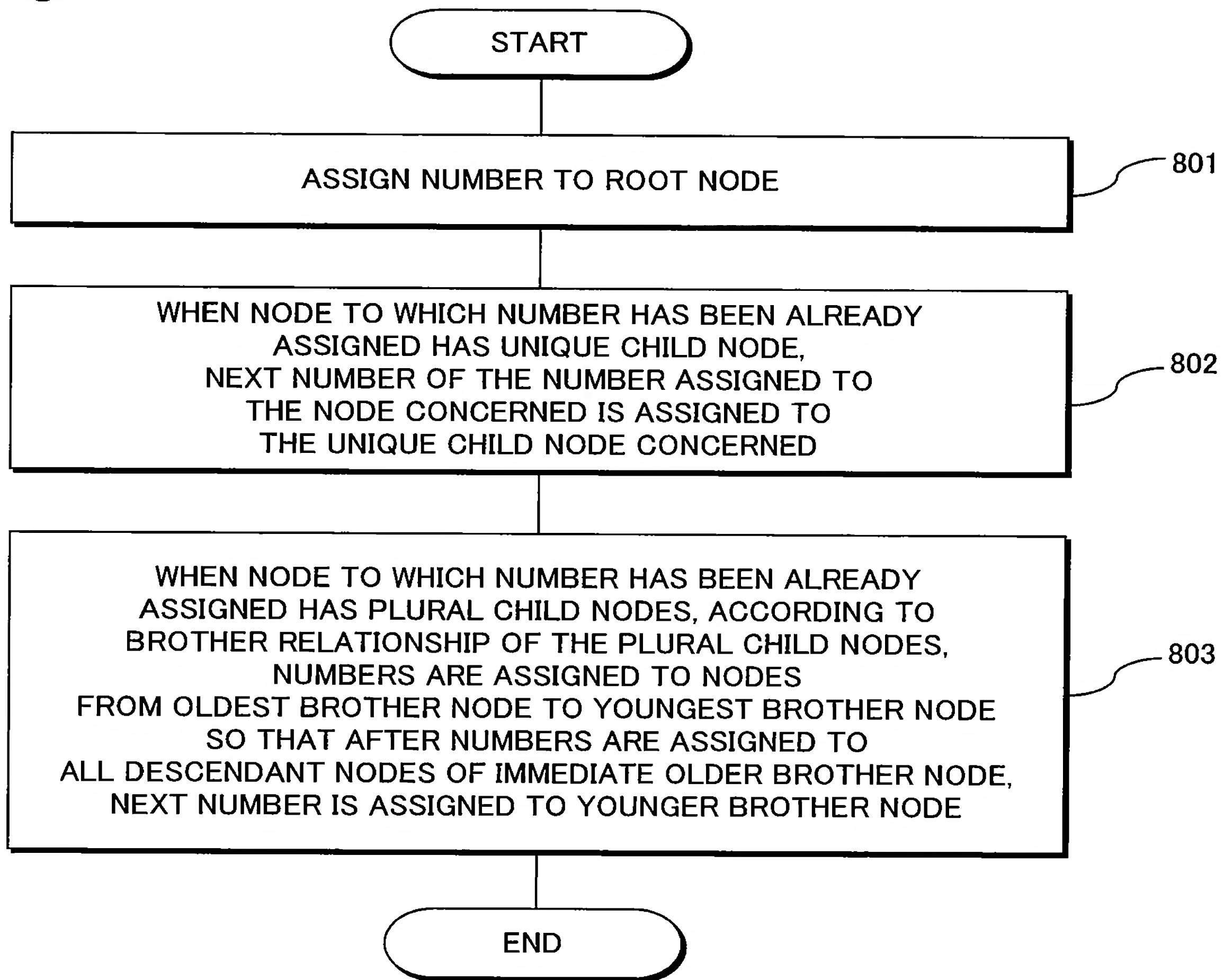


Fig.9

ARRAY OF PARENT-CHILD RELATIONSHIP
BASED ON "CHILD→PARENT" RELATIONSHIP OF DEPTH-FIRST

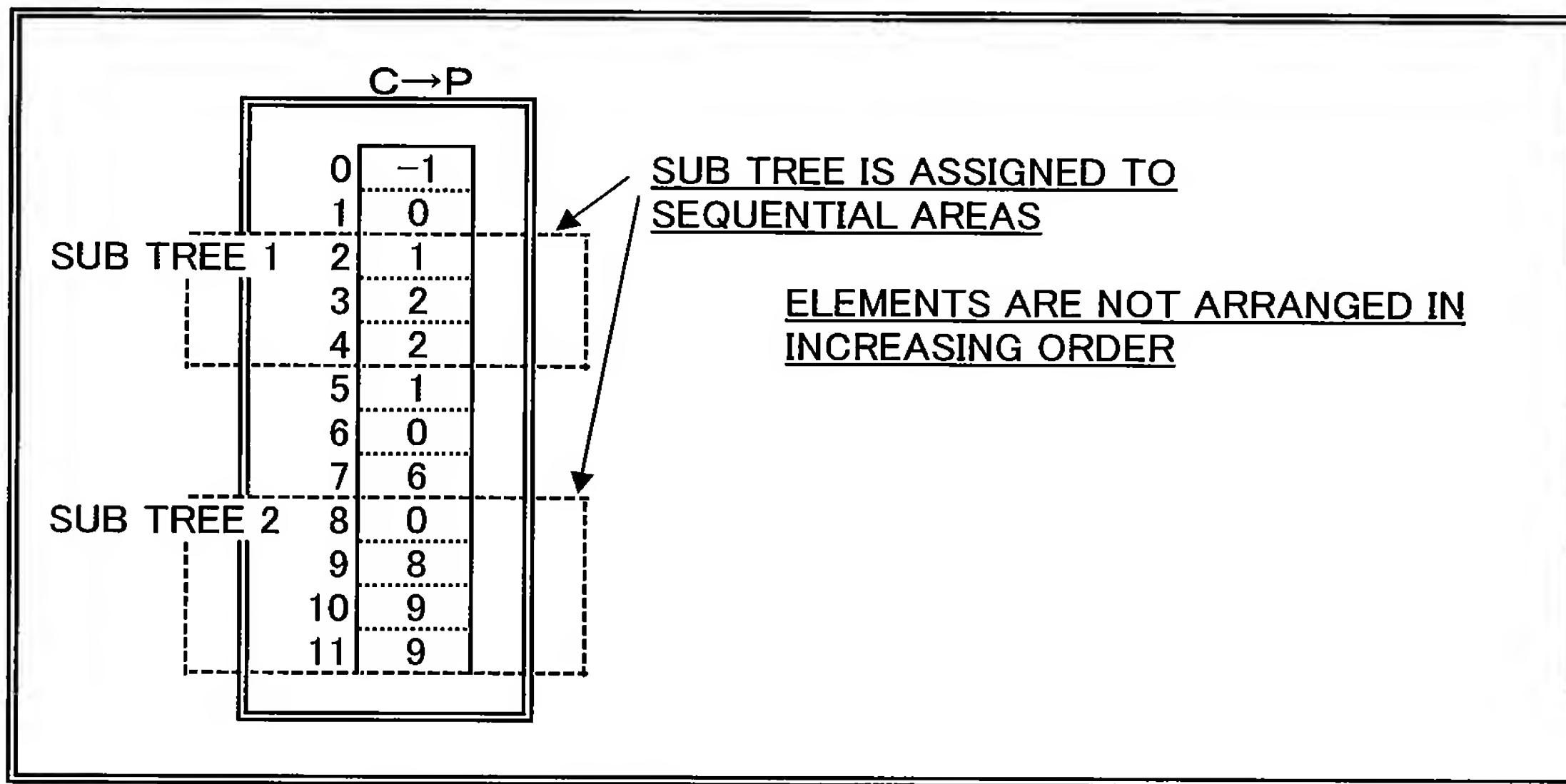


Fig.10

ARRAY OF PARENT-CHILD RELATIONSHIP
BASED ON "PARENT→CHILD" RELATIONSHIP OF DEPTH-FIRST

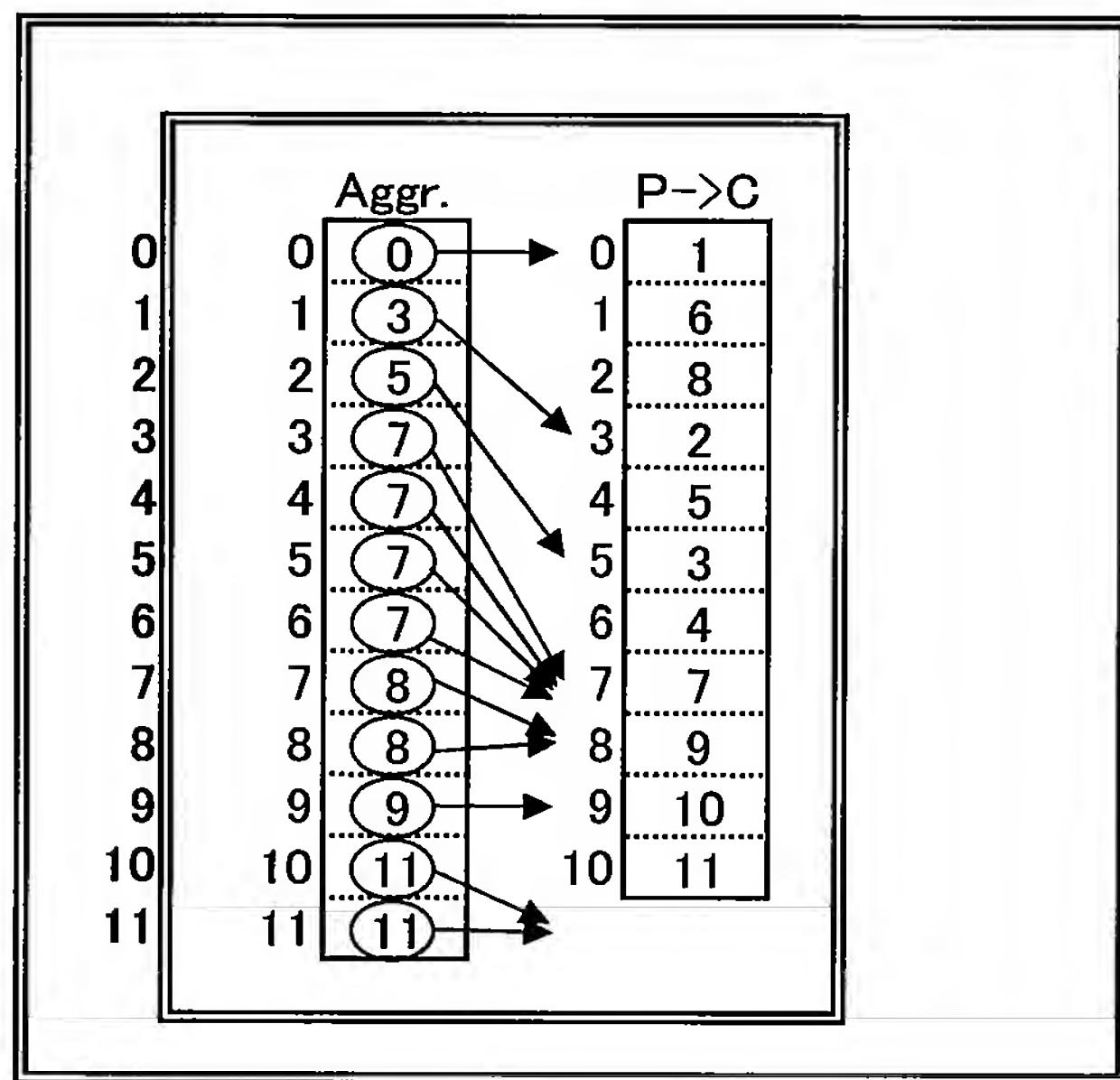


Fig.11

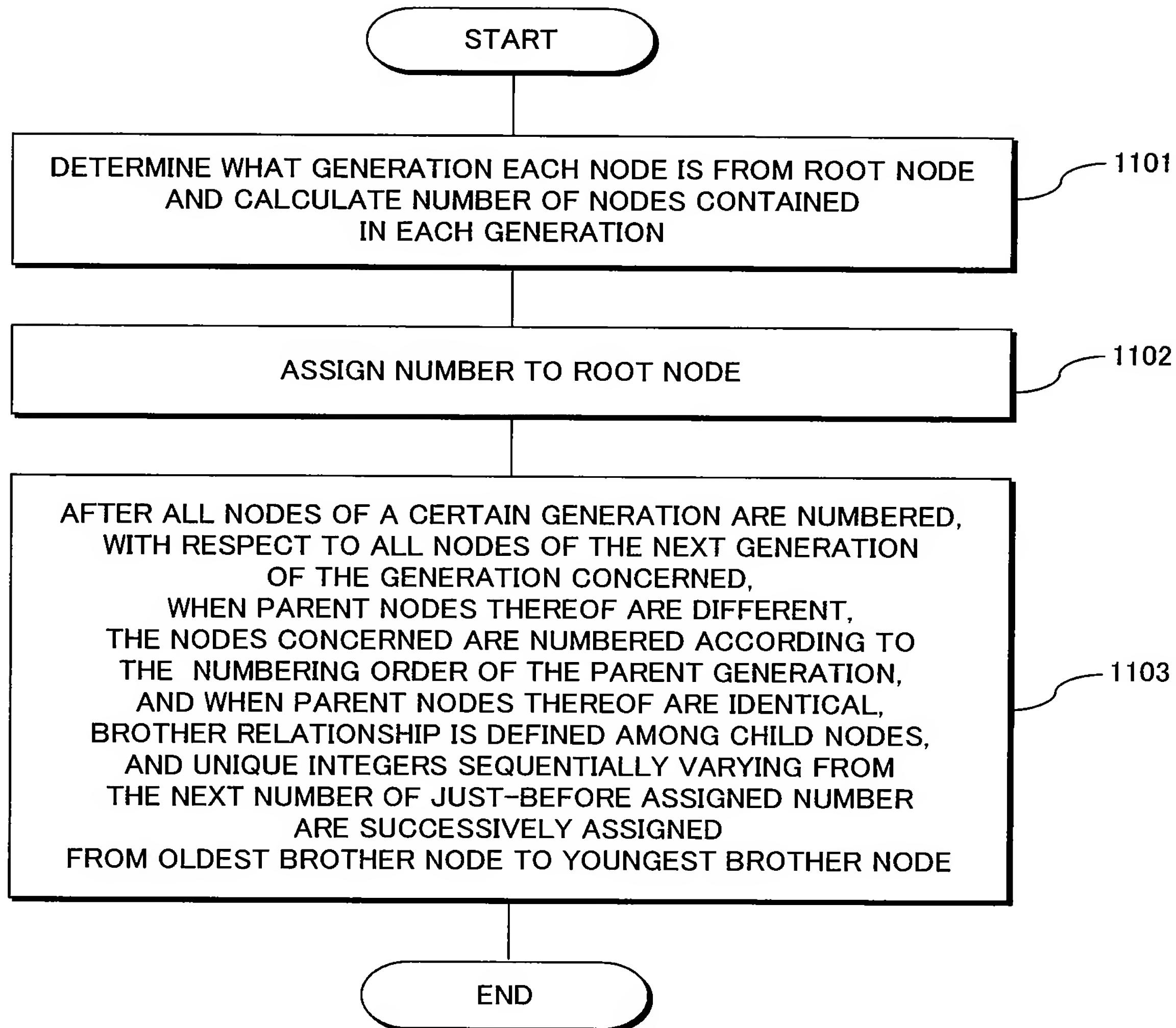


Fig.12

ARRAY OF PARENT-CHILD RELATIONSHIP
BASED ON "CHILD→PARENT" RELATIONSHIP OF WIDTH-FIRST

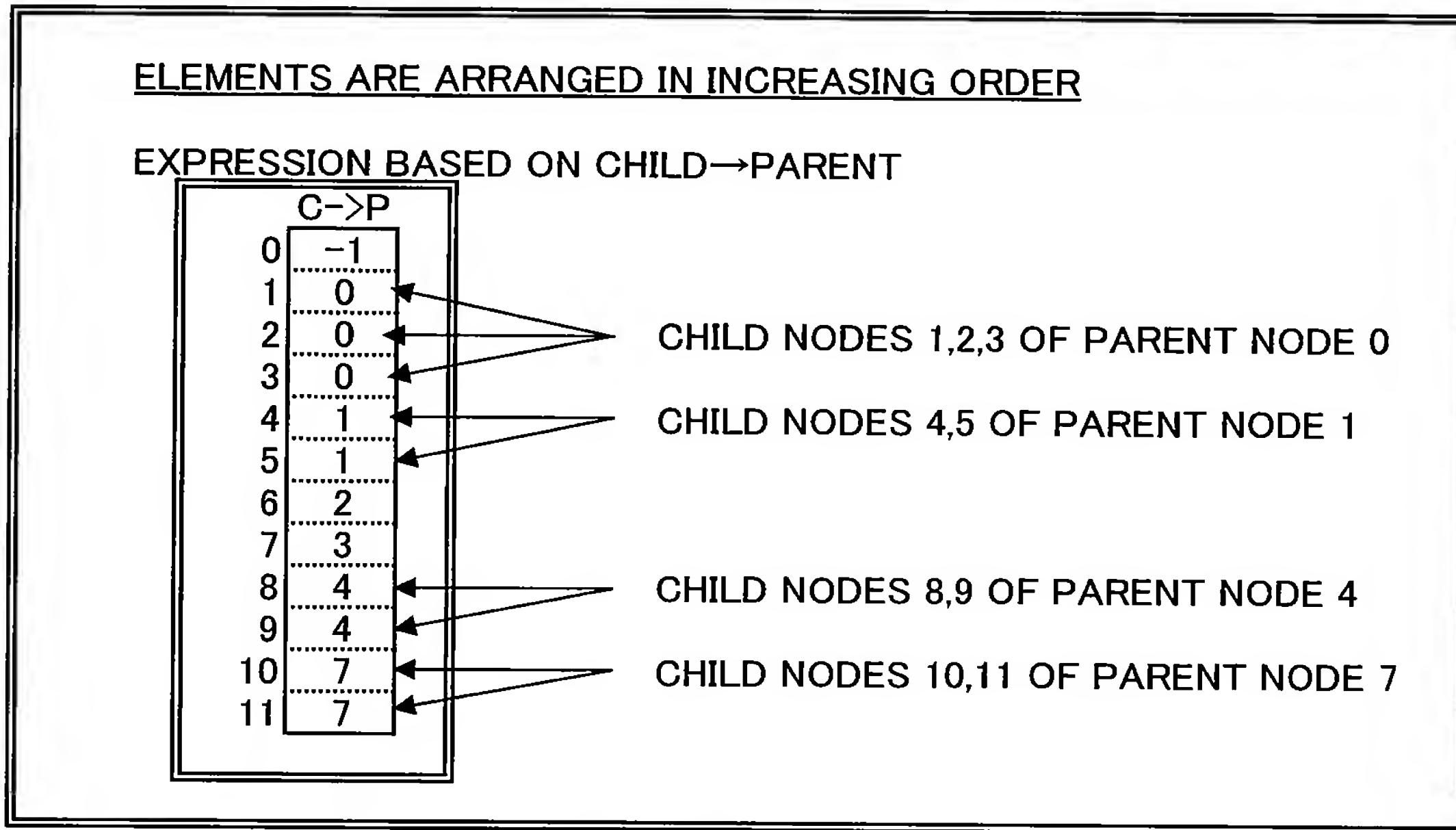


Fig.13

ARRAY OF PARENT-CHILD RELATIONSHIP
BASED ON "PARENT→CHILD" RELATIONSHIP OF WIDTH-FIRST

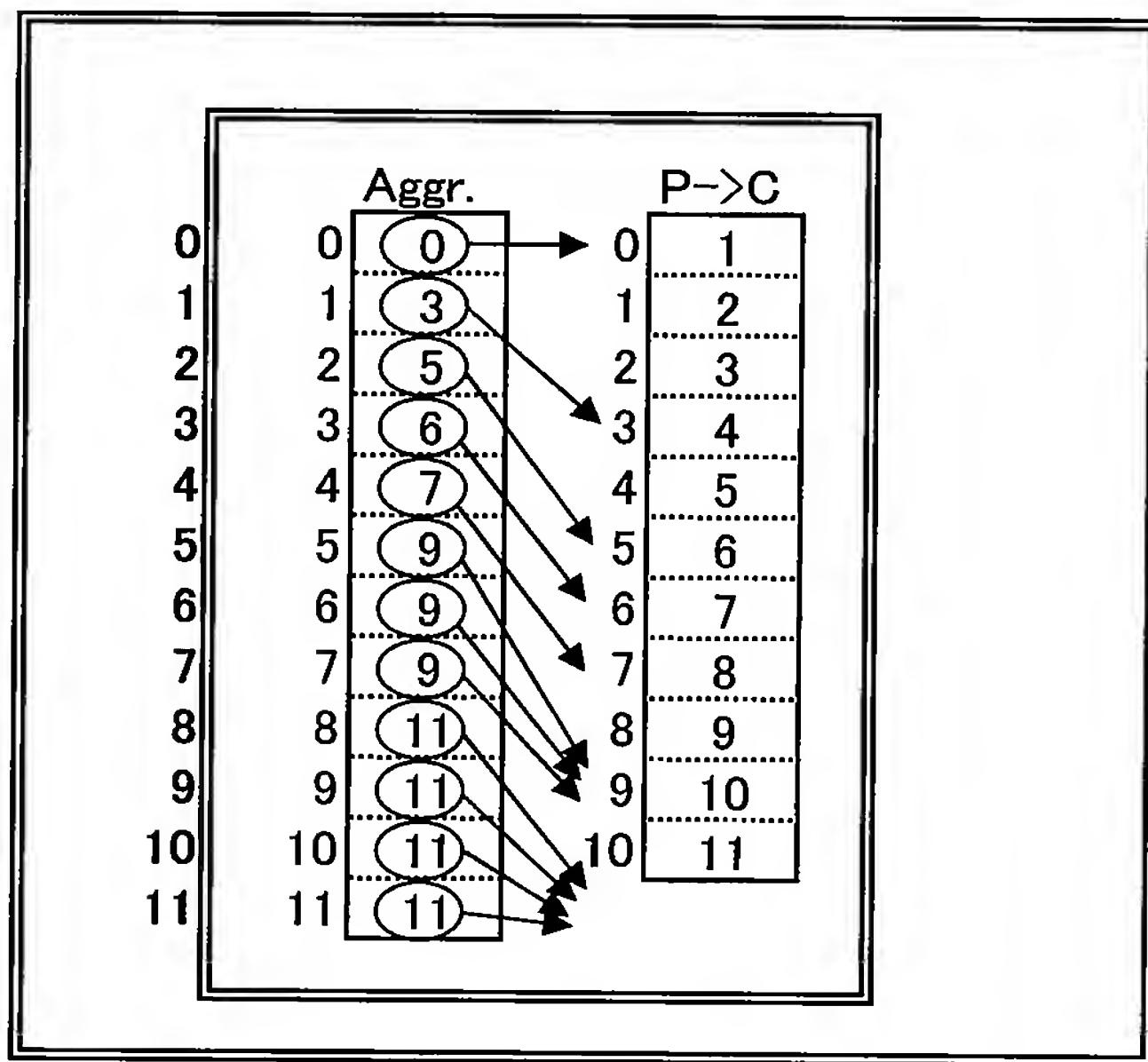


Fig.14

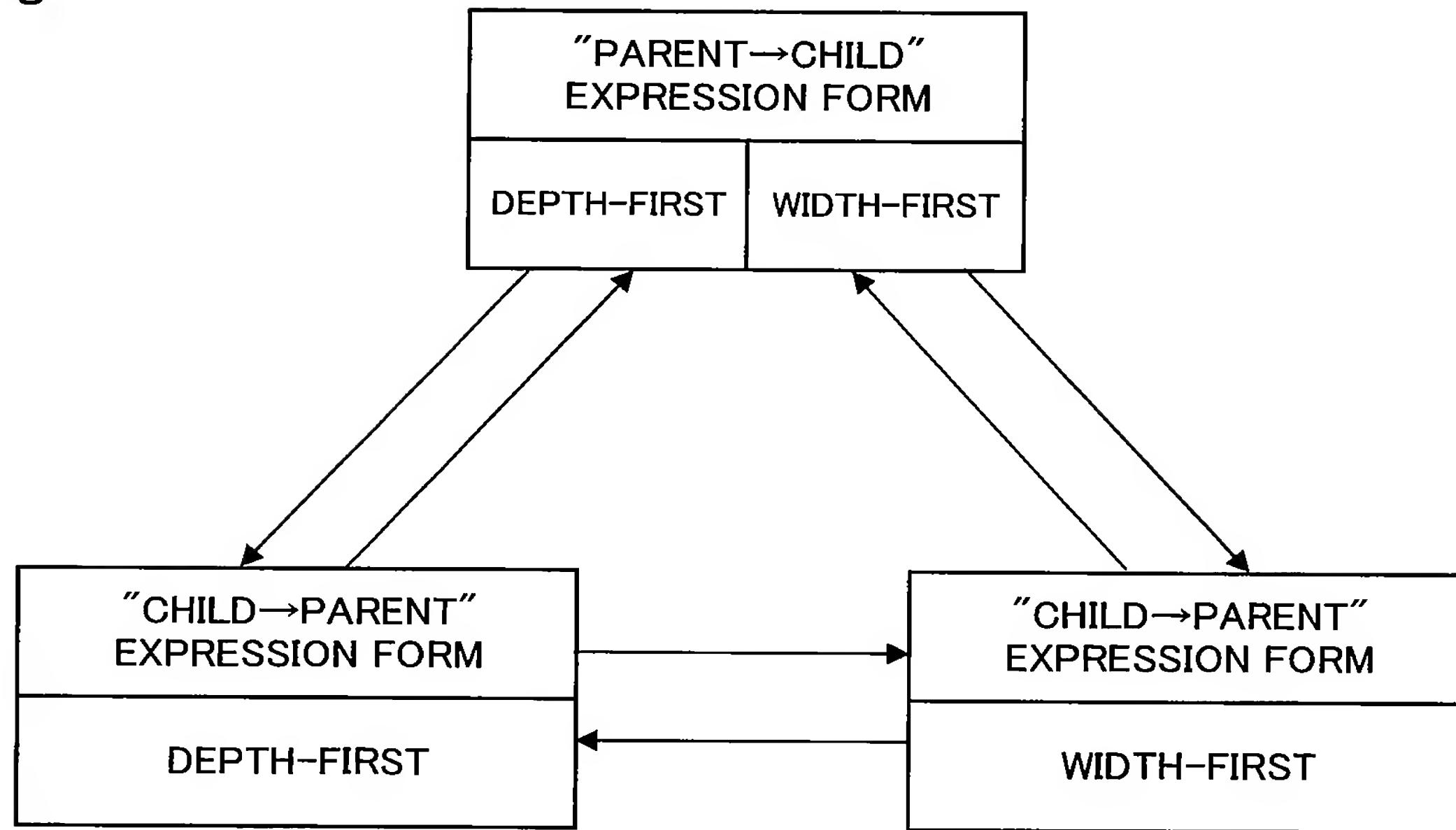


Fig.15

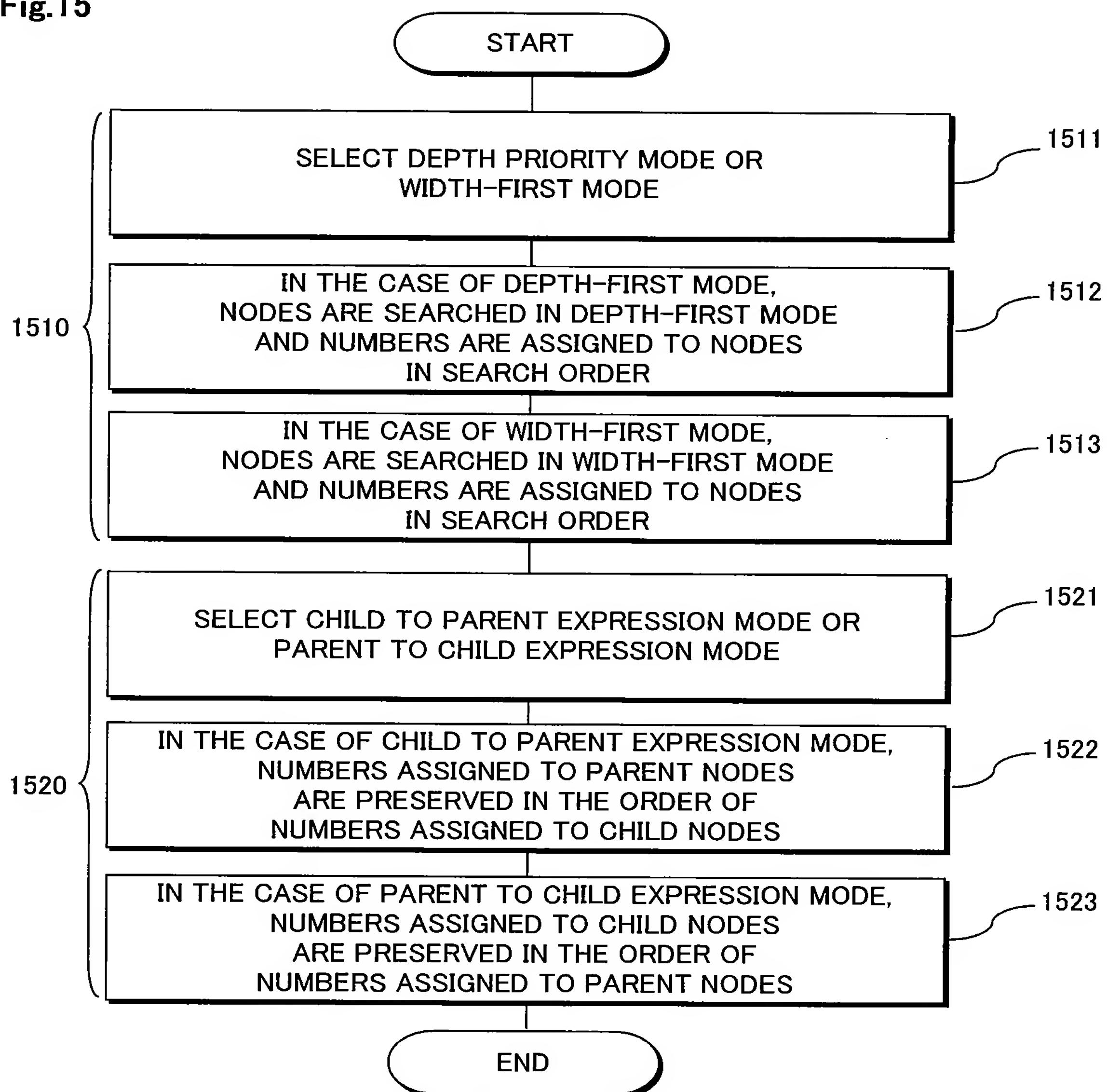


Fig. 16A

DEPTH-FIRST "CHILD→PARENT" EXPRESSION

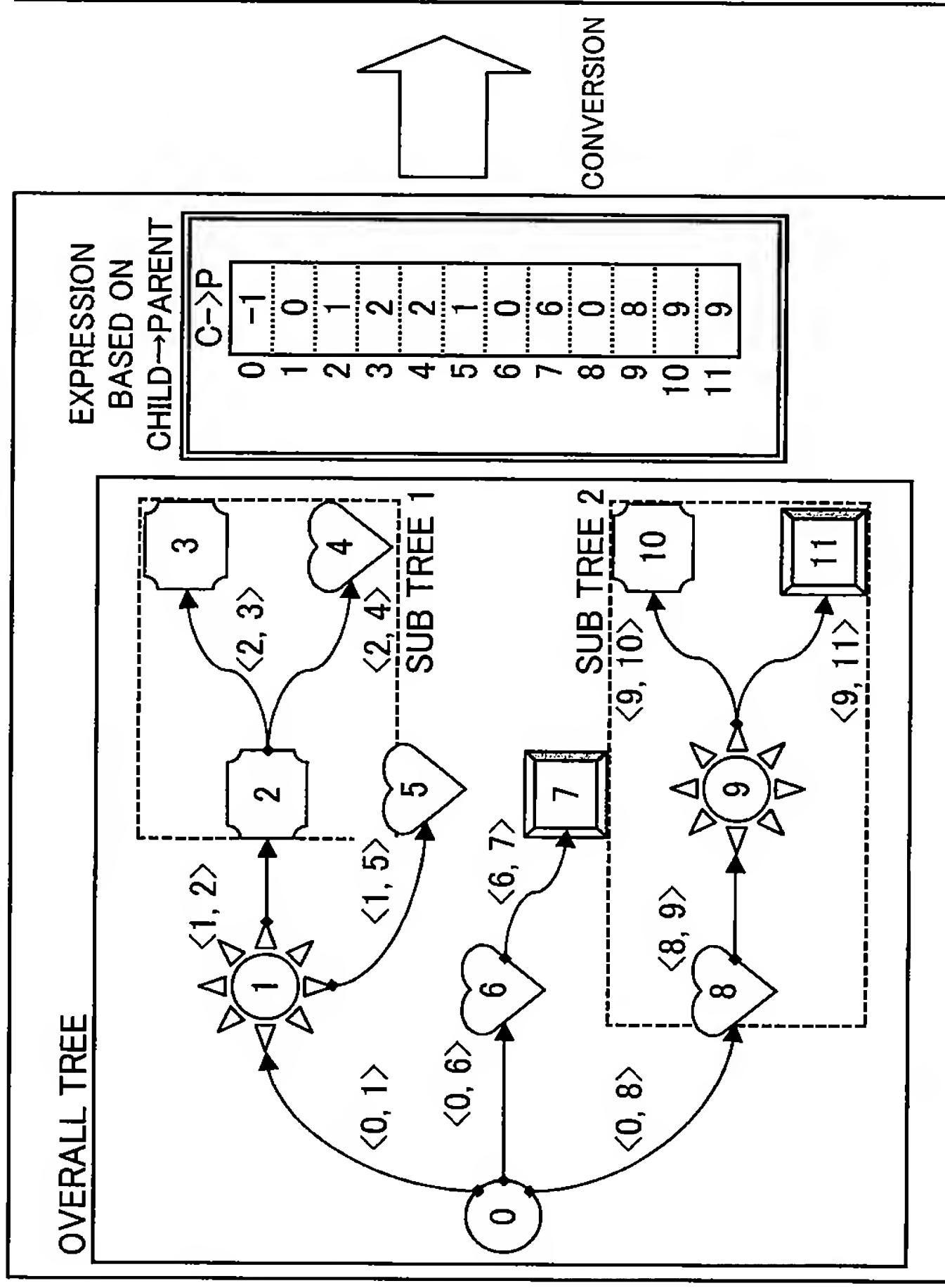


Fig. 16B

WIDTH-FIRST "CHILD→PARENT" EXPRESSION

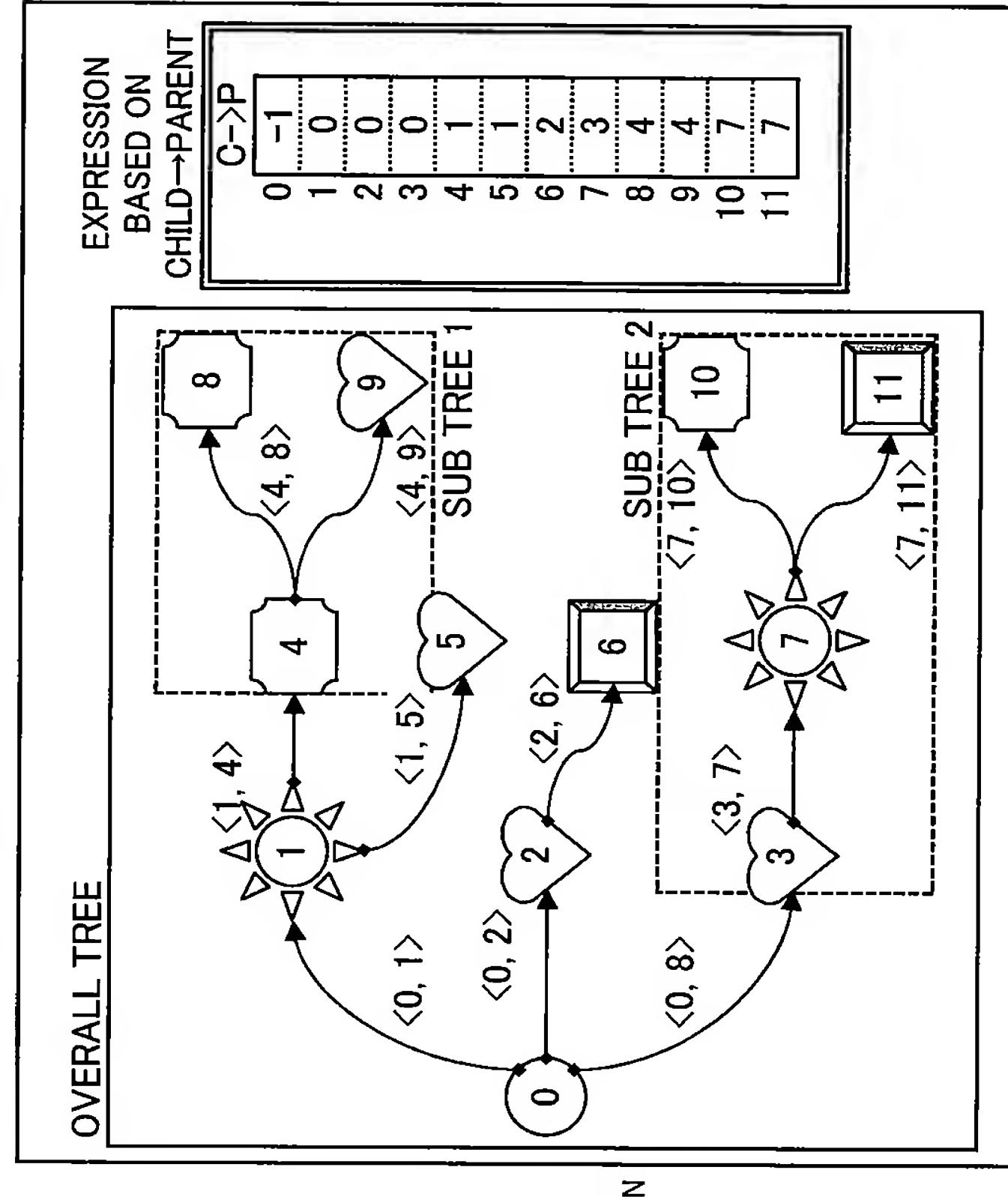


Fig.17

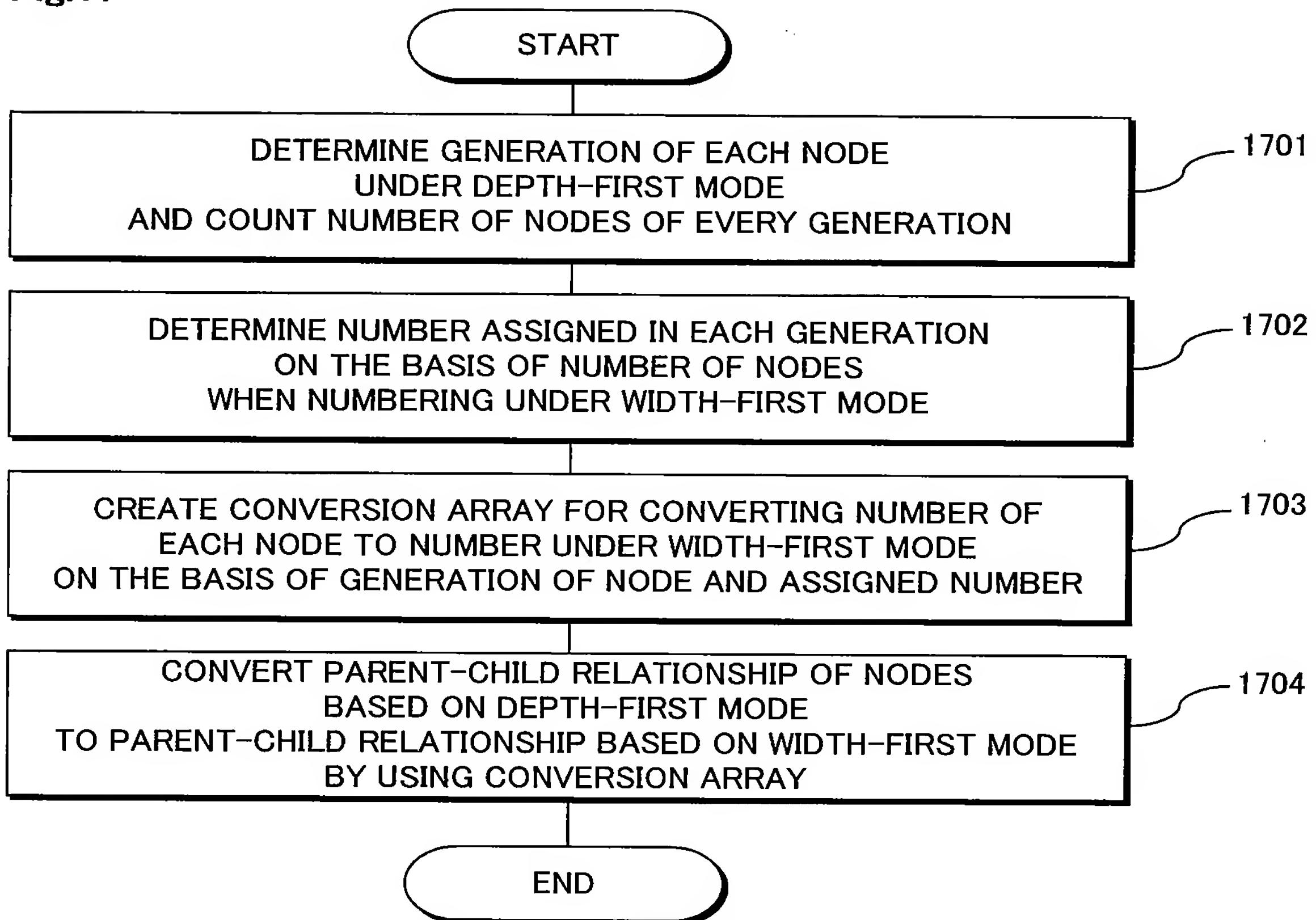


Fig.18A

PROCEDURE 0		
EXPRESSION BASED ON CHILD→PARENT		
C→P	depth	depth- count
0 -1	0 -	0 0
1 0	1 -	1 0
2 1	2 -	2 0
3 2	3 -	3 0
4 2	4 -	4 0
5 1	5 -	
6 0	6 -	
7 6	7 -	
8 0	8 -	
9 8	9 -	
10 9	10 -	
11 9	11 -	

Fig.18B

PROCEDURE 1		
EXPRESSION BASED ON CHILD→PARENT		
C→P	depth	depth- count
0 -1	0 -->0	0 0->1
1 0	1 -	1 0
2 1	2 -	2 0
3 2	3 -	3 0
4 2	4 -	4 0
5 1	5 -	
6 0	6 -	
7 6	7 -	
8 0	8 -	
9 8	9 -	
10 9	10 -	
11 9	11 -	

Fig.18C

PROCEDURE 2		
EXPRESSION BASED ON CHILD→PARENT		
C→P	depth	depth- count
0 -1	0 0	0 1
1 0	1 -->1	1 0->1
2 1	2 -	2 0
3 2	3 -	3 0
4 2	4 -	4 0
5 1	5 -	
6 0	6 -	
7 6	7 -	
8 0	8 -	
9 8	9 -	
10 9	10 -	
11 9	11 -	

Fig.19A

PROCEDURE 3

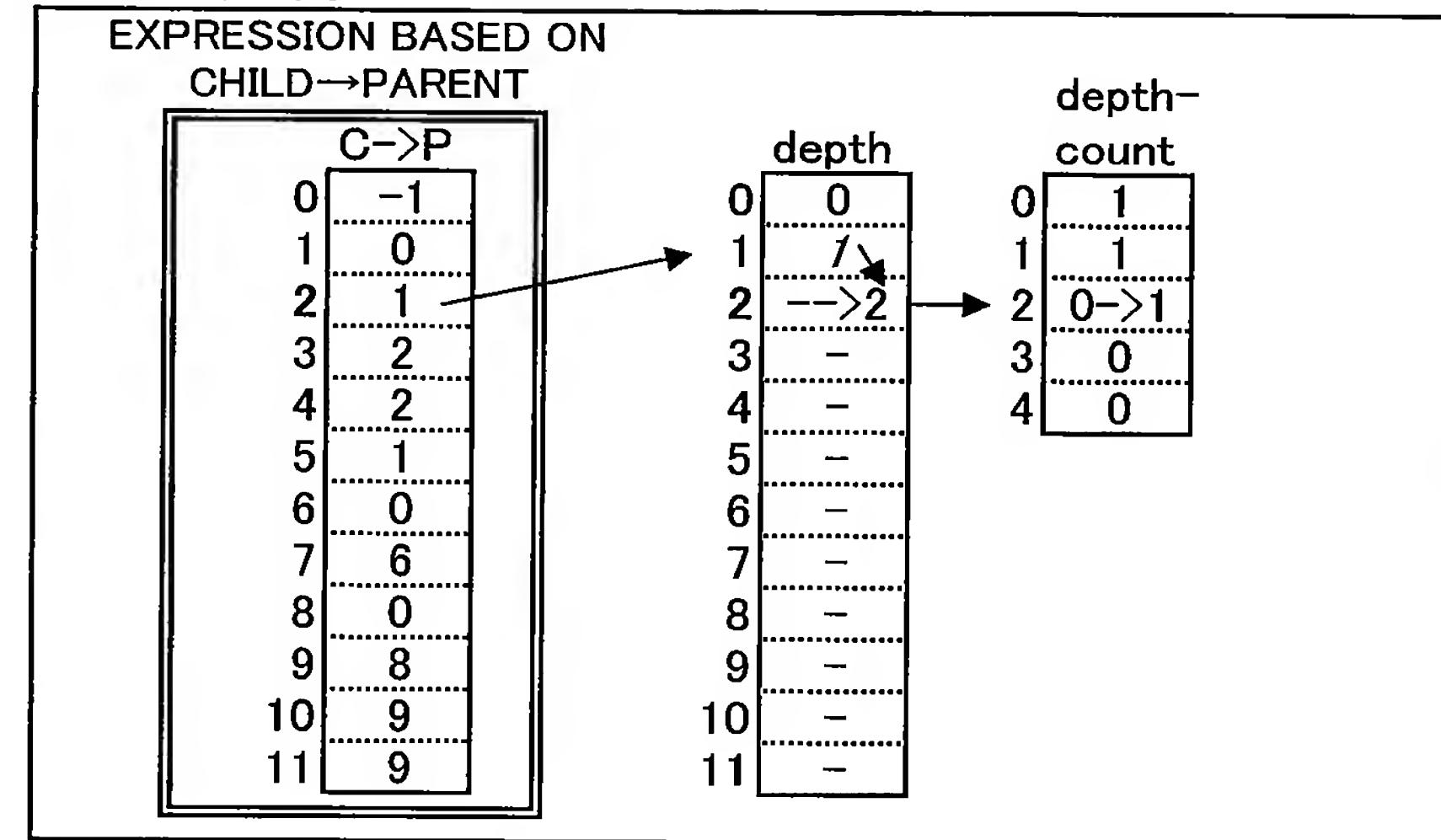


Fig.19B

PROCEDURE 4

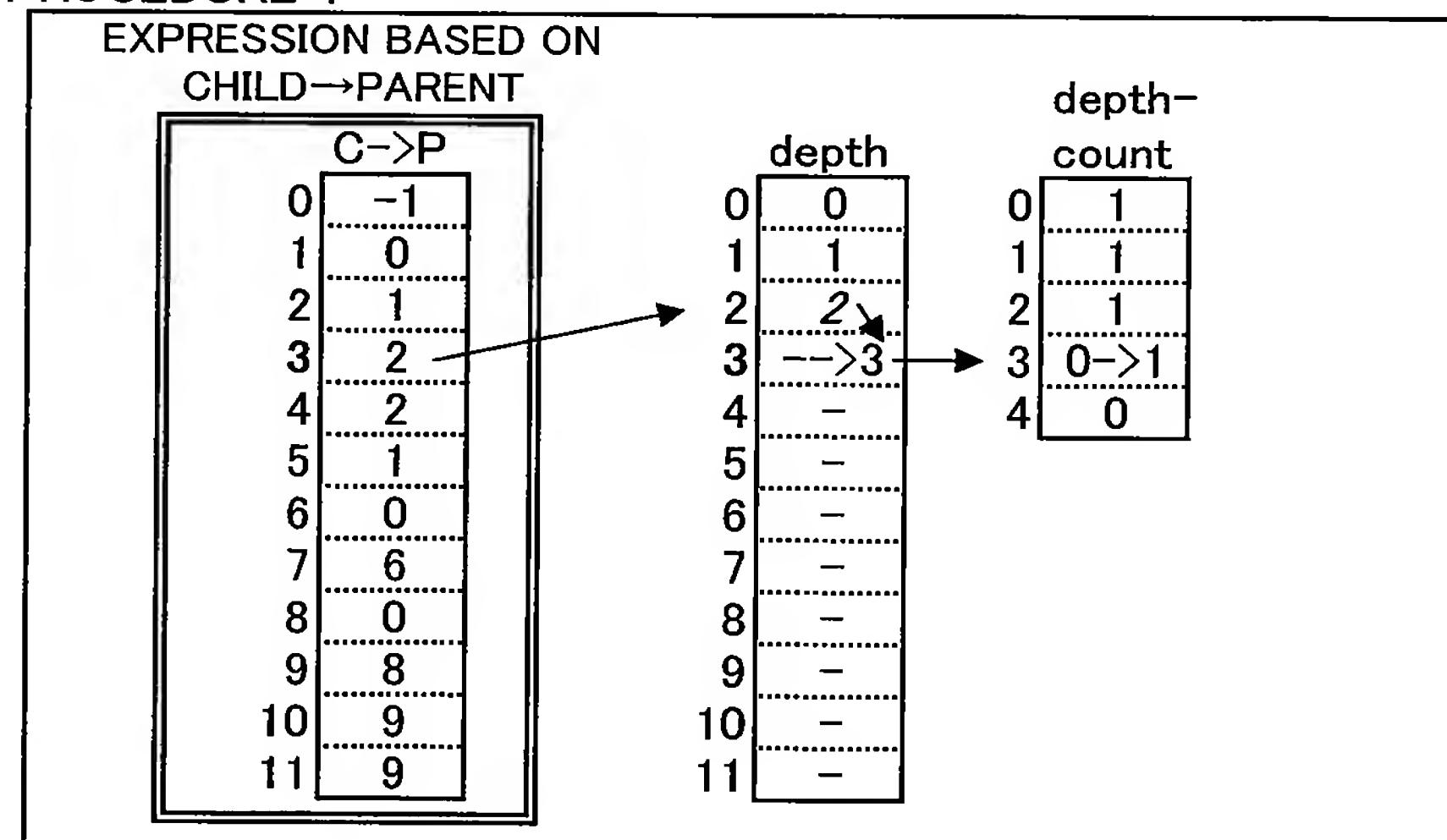


Fig.19C

PROCEDURE 5

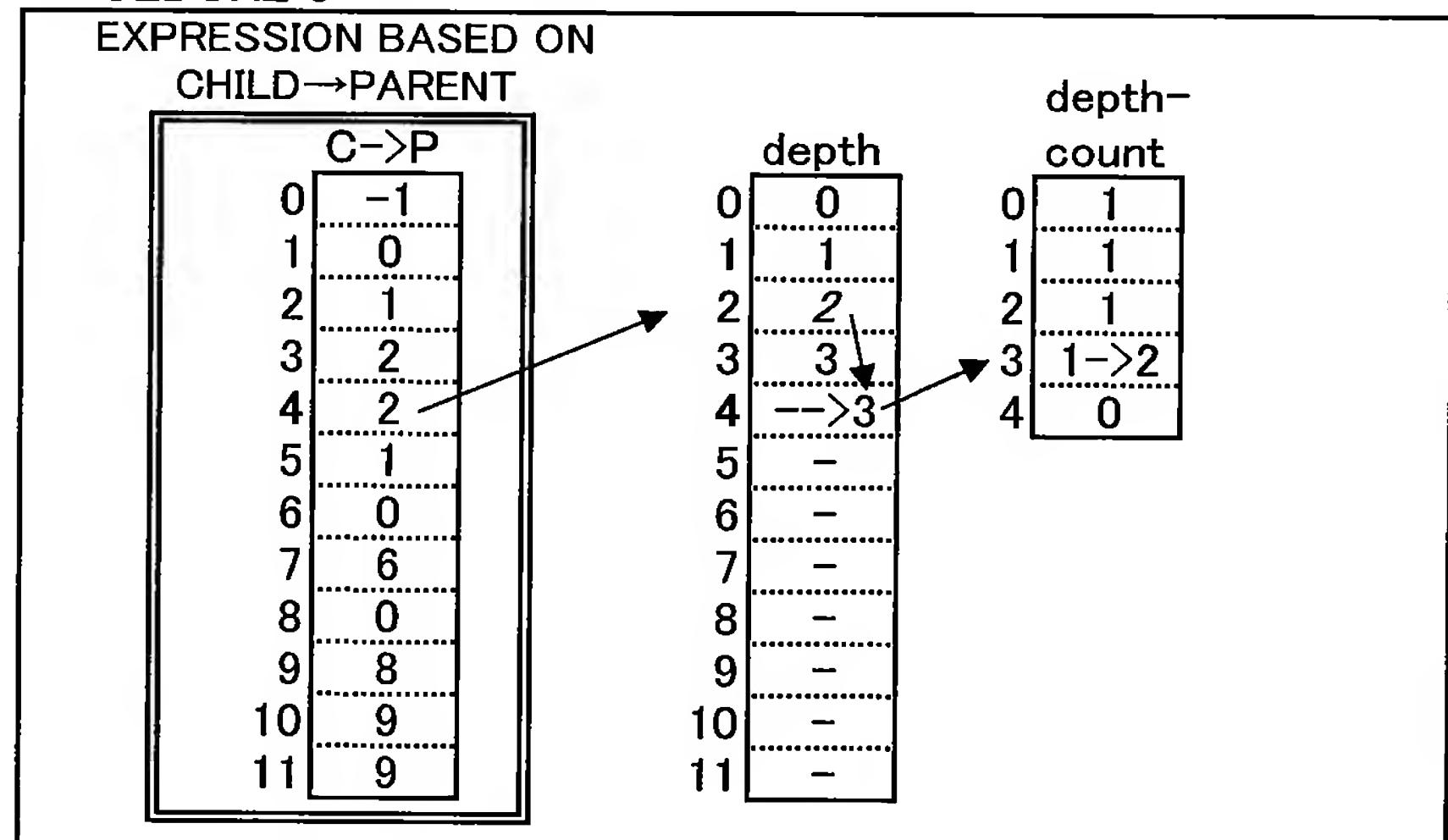


Fig.20A

PROCEDURE 6
EXPRESSION BASED ON
CHILD→PARENT

C→P
0 -1
1 0
2 1
3 2
4 2
5 1
6 0
7 6
8 0
9 8
10 9
11 9

depth
0 0
1 1
2 2
3 3
4 3
5 -->2
6 -
7 -
8 -
9 -
10 -
11 -

depth-count
0 1
1 1
2 1->2
3 2
4 0

Fig.20B

PROCEDURE 7
EXPRESSION BASED ON
CHILD→PARENT

C→P
0 -1
1 0
2 1
3 2
4 2
5 1
6 0
7 6
8 0
9 8
10 9
11 9

depth
0 0
1 1
2 2
3 3
4 3
5 2
6 -->1
7 -
8 -
9 -
10 -
11 -

depth-count
0 1
1 1->2
2 2
3 2
4 0

Fig.20C

PROCEDURE 8
EXPRESSION BASED ON
CHILD→PARENT

C→P
0 -1
1 0
2 1
3 2
4 2
5 1
6 0
7 6
8 0
9 8
10 9
11 9

depth
0 0
1 1
2 2
3 3
4 3
5 2
6 1
7 -->2
8 -
9 -
10 -
11 -

depth-count
0 1
1 2
2 2->3
3 2
4 0

Fig.21A

PROCEDURE 9

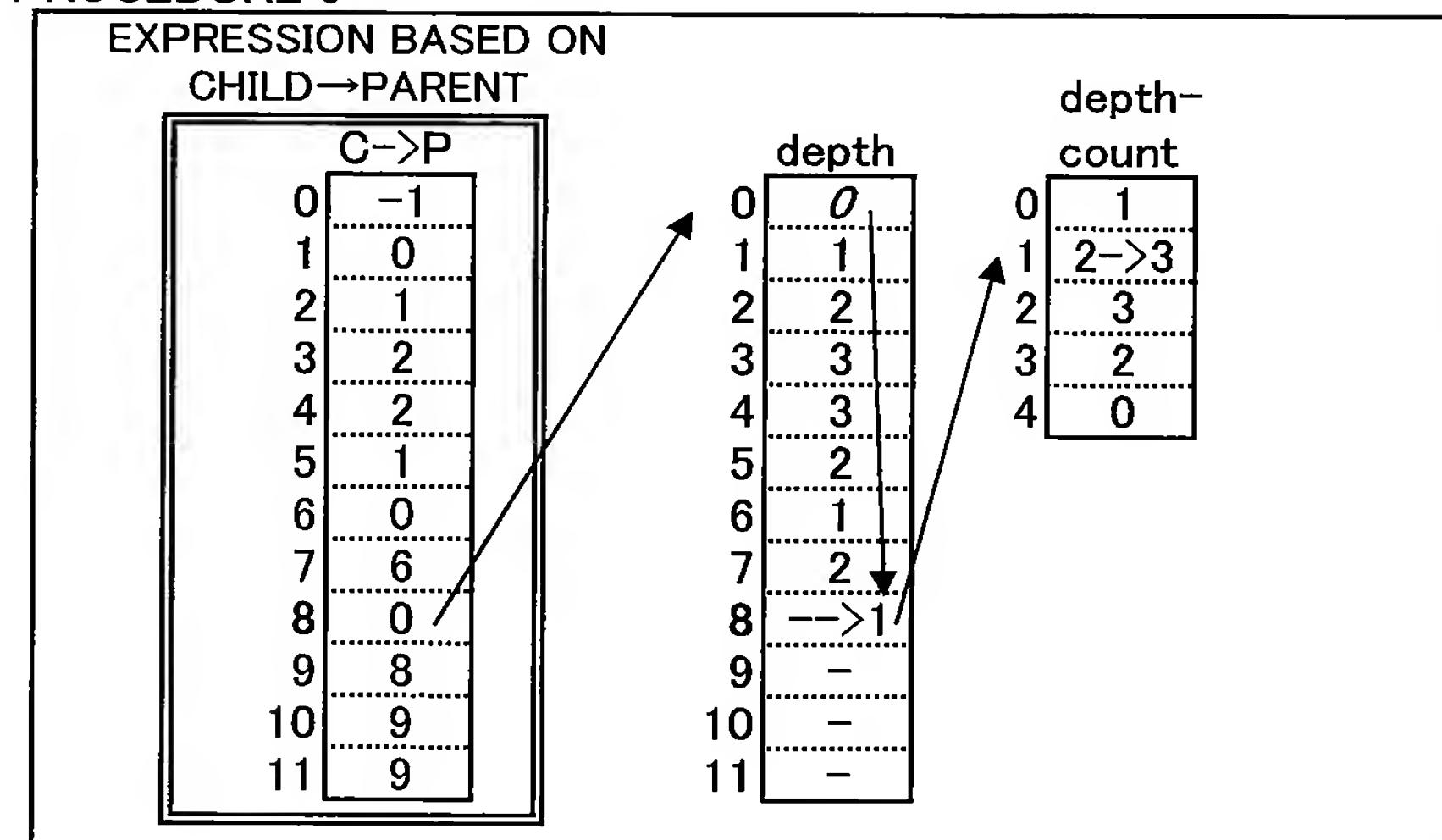


Fig.21B

PROCEDURE 10

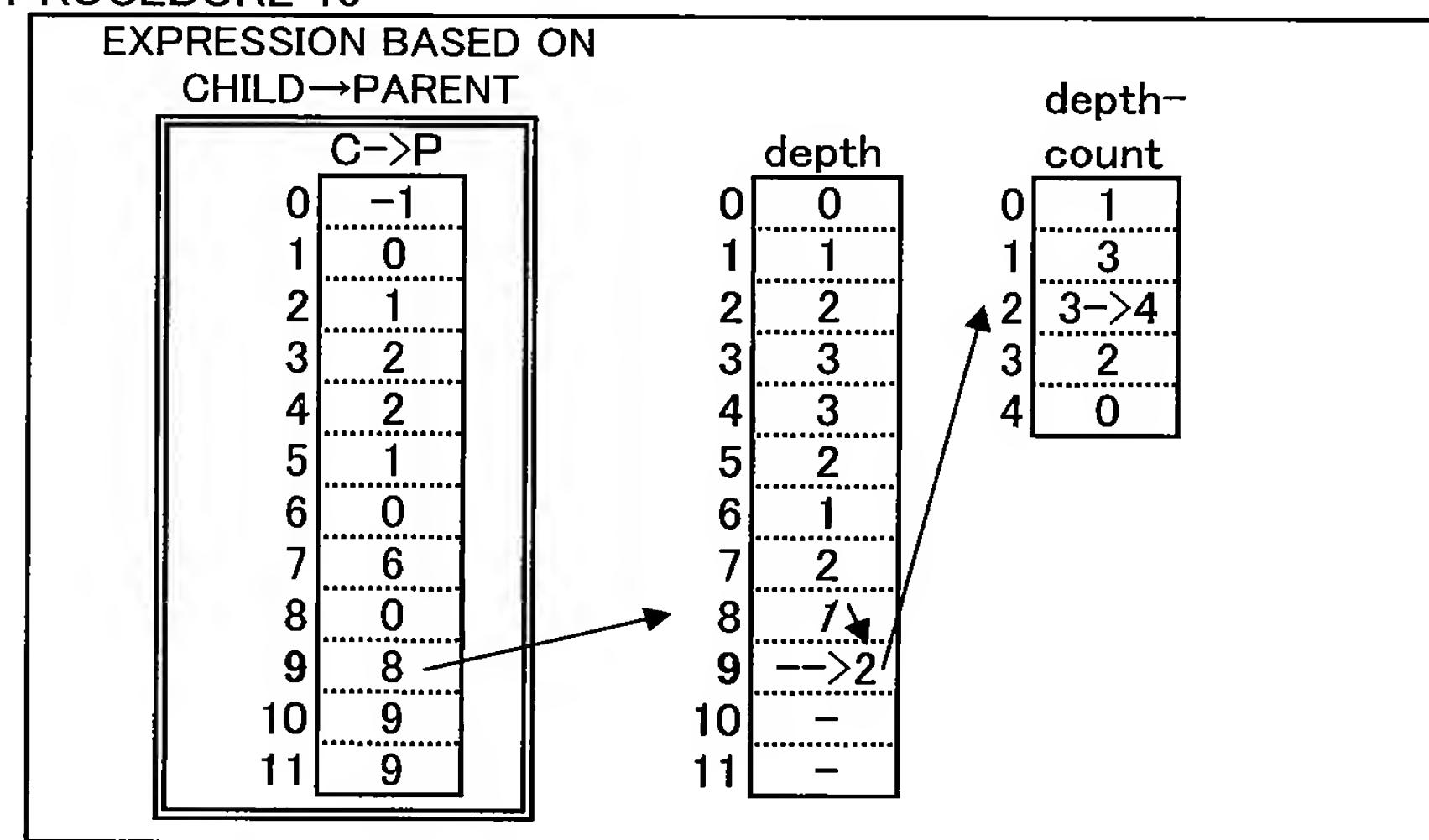


Fig.21C

PROCEDURE 11

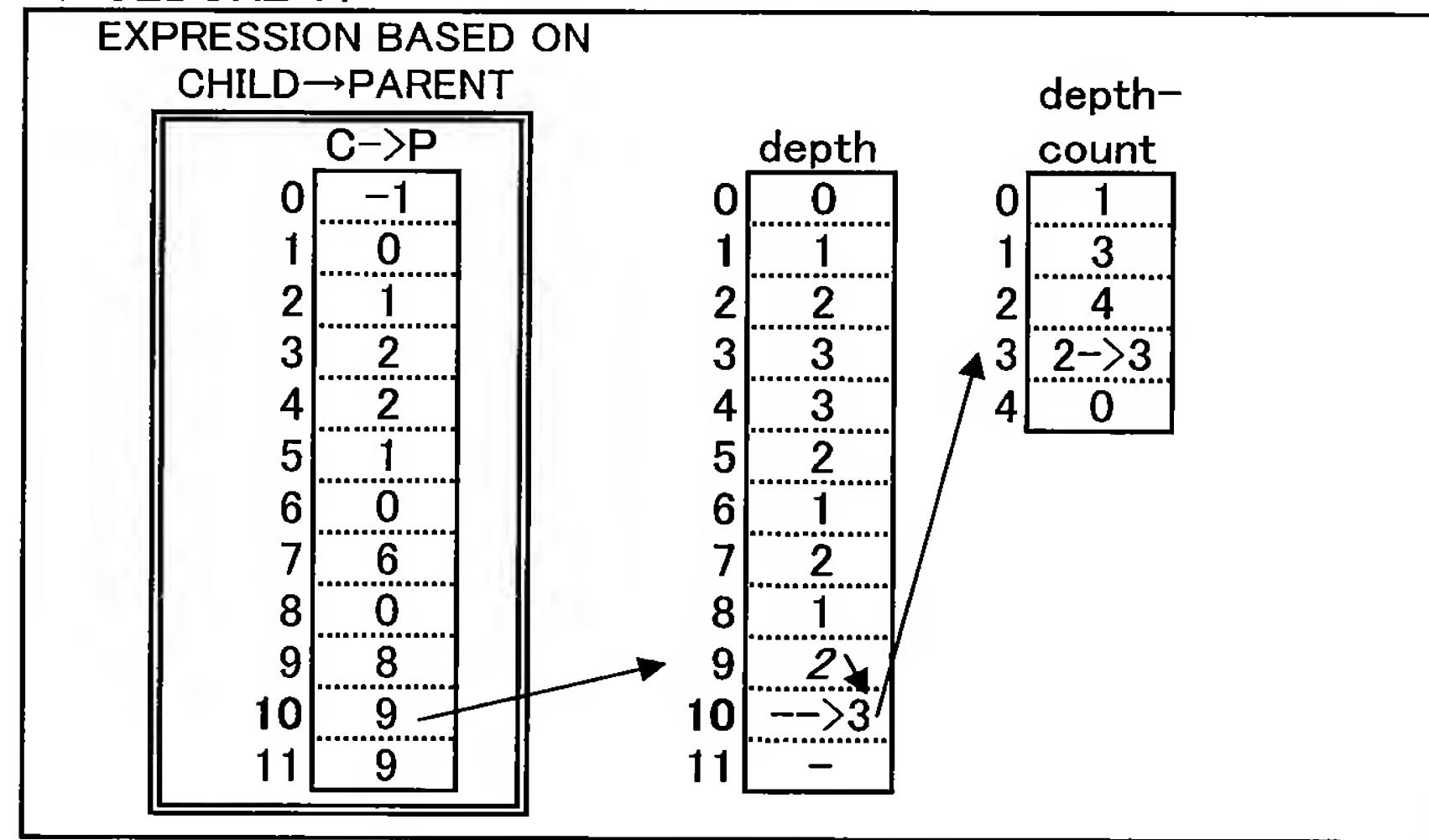


Fig.22

PROCEDURE 12
EXPRESSION BASED ON
CHILD→PARENT

C->P		depth	depth-count
0	-1	0	0
1	0	1	1
2	1	2	3
3	2	3	4
4	2	4	3->4
5	1	5	
6	0	6	
7	6	7	
8	0	8	
9	8	9	
10	9	10	
11	9	11	-->3

Fig.23

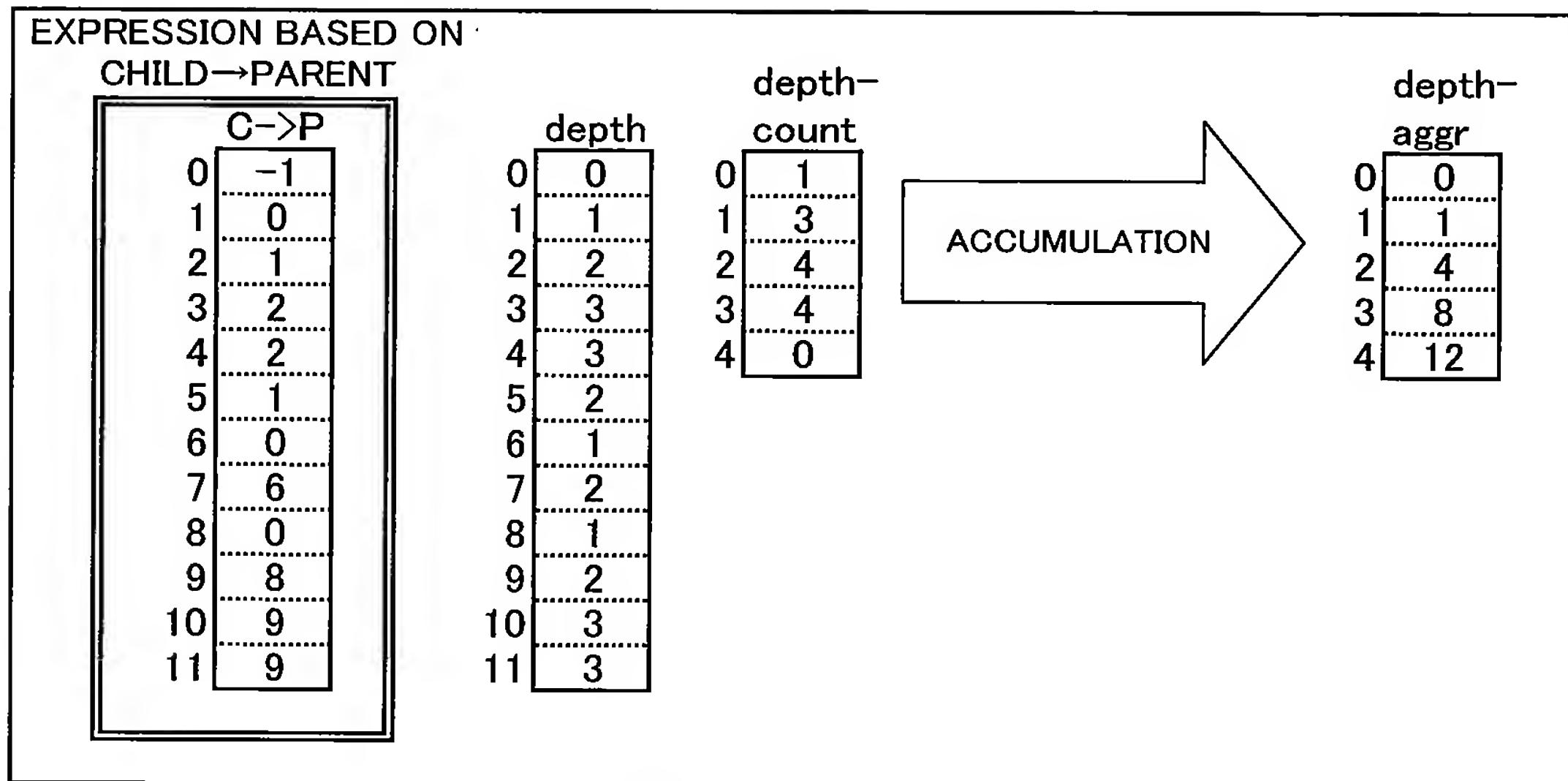


Fig.24A

PROCEDURE 0

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		depth	depth- aggr	CONVERSION DEFINITION OF "No."
C→P		0 0	0 0	0 -
0 -1		1 1	1 1	1 -
1 0		2 2	2 4	2 -
2 1		3 3	3 8	3 -
3 2		4 3	4 12	4 -
4 2		5 2		5 -
5 1		6 1		6 -
6 0		7 2		7 -
7 6		8 1		8 -
8 0		9 2		9 -
9 8		10 3		10 -
10 9		11 3		11 -
11 9				

Fig.24B

PROCEDURE 1

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		depth	depth- aggr	CONVERSION DEFINITION OF "No."
C→P		0 0	0 0->1	0 -->0
0 -1		1 1	1 1	1 -
1 0		2 2	2 4	2 -
2 1		3 3	3 8	3 -
3 2		4 3	4 12	4 -
4 2		5 2		5 -
5 1		6 1		6 -
6 0		7 2		7 -
7 6		8 1		8 -
8 0		9 2		9 -
9 8		10 3		10 -
10 9		11 3		11 -
11 9				

Fig.24C

PROCEDURE 2

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		depth	depth- aggr	CONVERSION DEFINITION OF "No."
C→P		0 0	0 1	0 0
0 -1		1 1	1 1->2	1 -->1
1 0		2 2	2 4	2 -
2 1		3 3	3 8	3 -
3 2		4 3	4 12	4 -
4 2		5 2		5 -
5 1		6 1		6 -
6 0		7 2		7 -
7 6		8 1		8 -
8 0		9 2		9 -
9 8		10 3		10 -
10 9		11 3		11 -
11 9				

Fig.25A

PROCEDURE 3

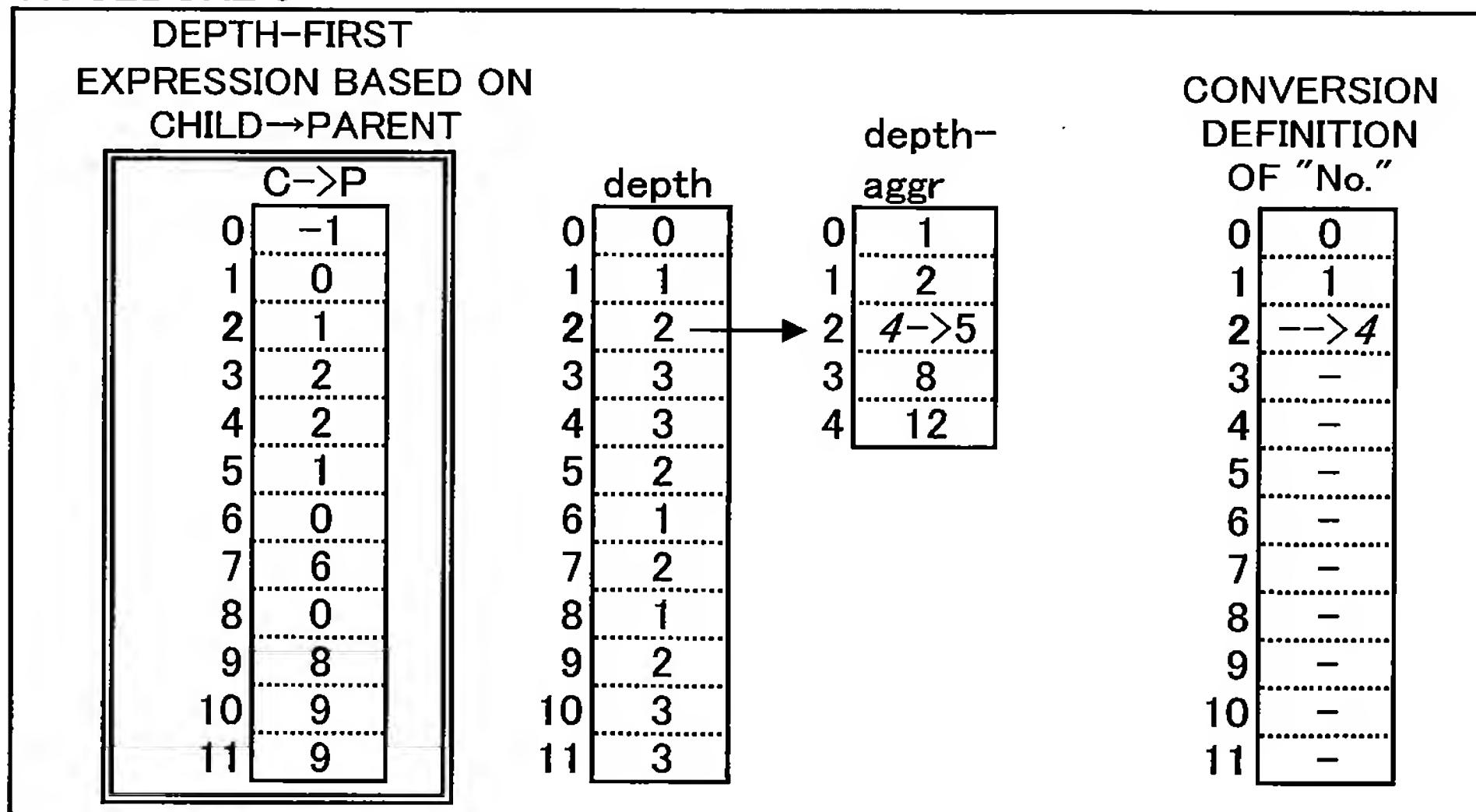


Fig.25B

PROCEDURE 4

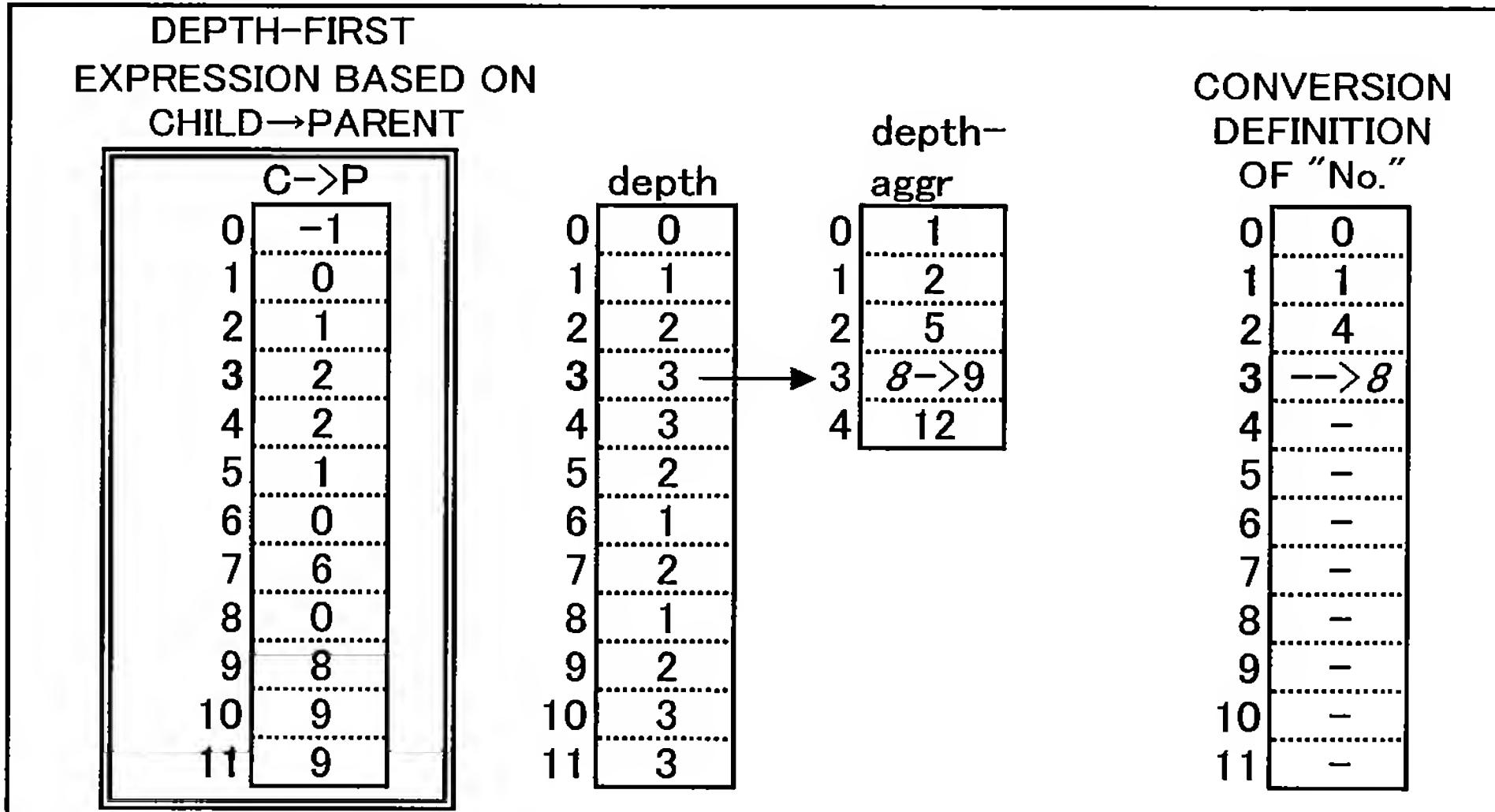


Fig.25C

PROCEDURE 5

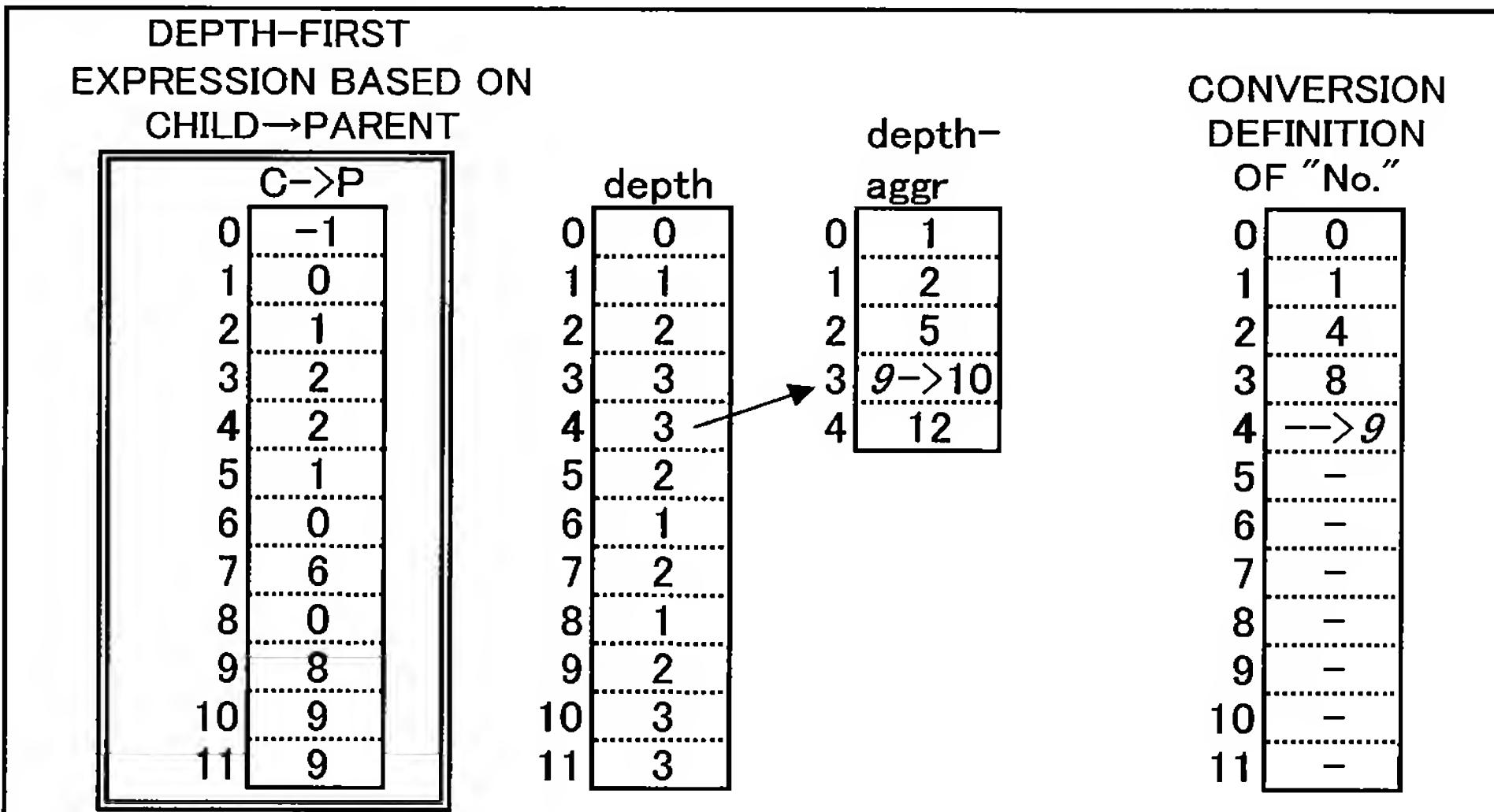


Fig.26A PROCEDURE 6

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P	depth	depth-aggr
0 -1	0 0	0 1
1 0	1 1	1 2
2 1	2 2	2 5->6
3 2	3 3	3 10
4 2	4 3	4 12
5 1	5 2	
6 0	6 1	
7 6	7 2	
8 0	8 1	
9 8	9 2	
10 9	10 3	
11 9	11 3	

Fig.26B PROCEDURE 7

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P	depth	depth-aggr
0 -1	0 0	0 1
1 0	1 1	1 2->3
2 1	2 2	2 6
3 2	3 3	3 10
4 2	4 3	4 12
5 1	5 2	
6 0	6 1	
7 6	7 2	
8 0	8 1	
9 8	9 2	
10 9	10 3	
11 9	11 3	

Fig.26C PROCEDURE 8

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P	depth	depth-aggr
0 -1	0 0	0 1
1 0	1 1	1 3
2 1	2 2	2 6->7
3 2	3 3	3 10
4 2	4 3	4 12
5 1	5 2	
6 0	6 1	
7 6	7 2	
8 0	8 1	
9 8	9 2	
10 9	10 3	
11 9	11 3	

Fig.27A PROCEDURE 9

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P		
0 -1	0 0	0 0
1 0	1 1	1 1
2 1	2 2	2 4
3 2	3 3	3 8
4 2	4 3	4 9
5 1	5 2	5 5
6 0	6 1	6 2
7 6	7 2	7 6
8 0	8 1	8 → 3
9 8	9 2	9 -
10 9	10 3	10 -
11 9	11 3	11 -

Fig.27B PROCEDURE 10

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P		
0 -1	0 0	0 0
1 0	1 1	1 1
2 1	2 2	2 4
3 2	3 3	3 8
4 2	4 3	4 9
5 1	5 2	5 5
6 0	6 1	6 2
7 6	7 2	7 6
8 0	8 1	8 3
9 8	9 2	9 → 7
10 9	10 3	10 -
11 9	11 3	11 -

Fig.27C PROCEDURE 11

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		CONVERSION DEFINITION OF "No."
C→P		
0 -1	0 0	0 0
1 0	1 1	1 1
2 1	2 2	2 4
3 2	3 3	3 8
4 2	4 3	4 9
5 1	5 2	5 5
6 0	6 1	6 2
7 6	7 2	7 6
8 0	8 1	8 3
9 8	9 2	9 7
10 9	10 3	10 → 10
11 9	11 3	11 -

Fig.28

PROCEDURE 12

DEPTH-FIRST EXPRESSION BASED ON CHILD→PARENT		depth	depth-aggr	CONVERSION DEFINITION OF "No."
C→P	0 -1	0 0	0 1	0 0
0 -1	1 0	1 1	1 4	1 1
1 0	2 1	2 2	2 8	2 4
2 1	3 2	3 3	3 11->12	3 8
3 2	4 2	4 3	4 12	4 9
4 2	5 1	5 2		5 5
5 1	6 0	6 1		6 2
6 0	7 6	7 2		7 6
7 6	8 0	8 1		8 3
8 0	9 8	9 2		9 7
9 8	10 9	10 3		10 10
10 9	11 9	11 3		11 ->11

Fig.29

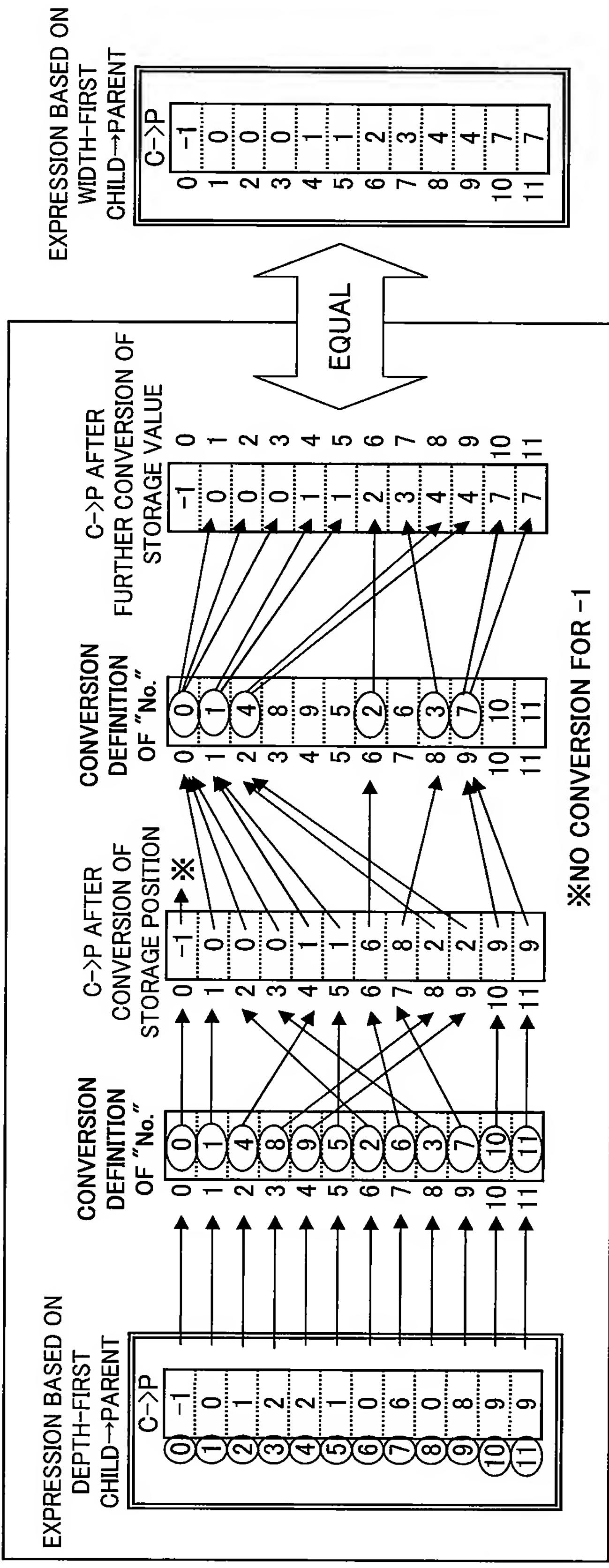


Fig.30A
WIDTH-FIRST "CHILD→PARENT" EXPRESSION

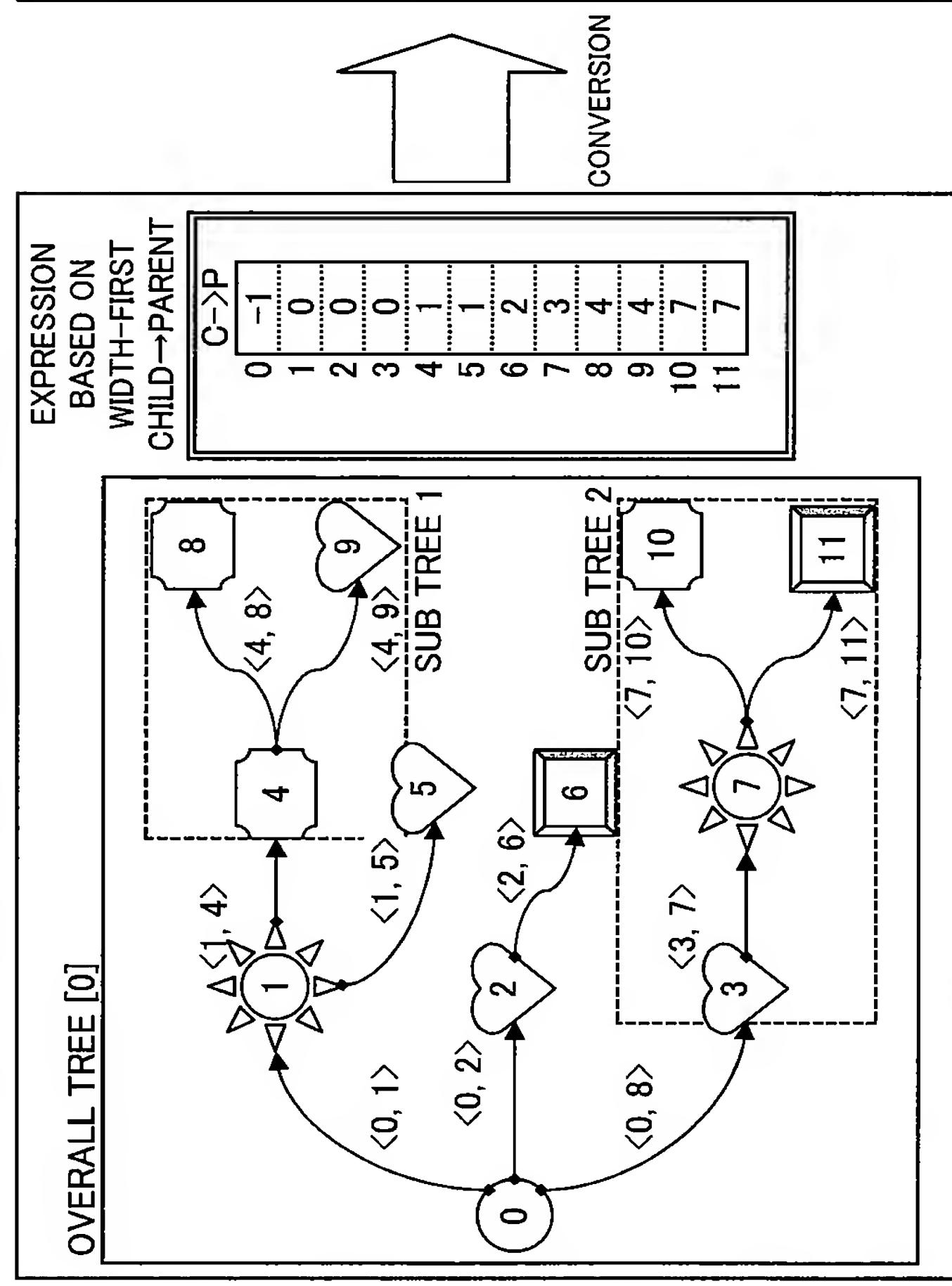


Fig.30B
DEPTH-FIRST "CHILD→PARENT" EXPRESSION

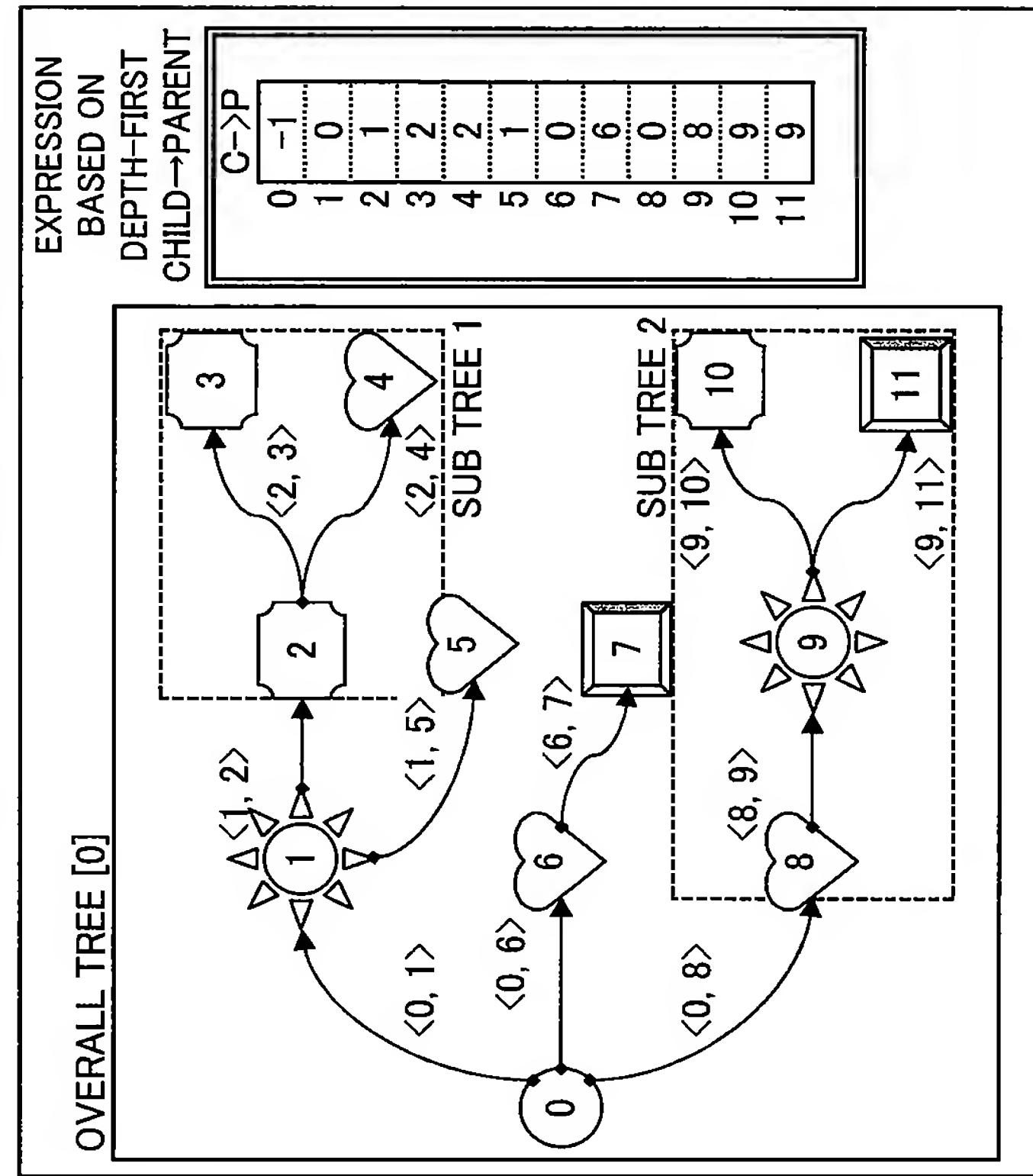


Fig.31

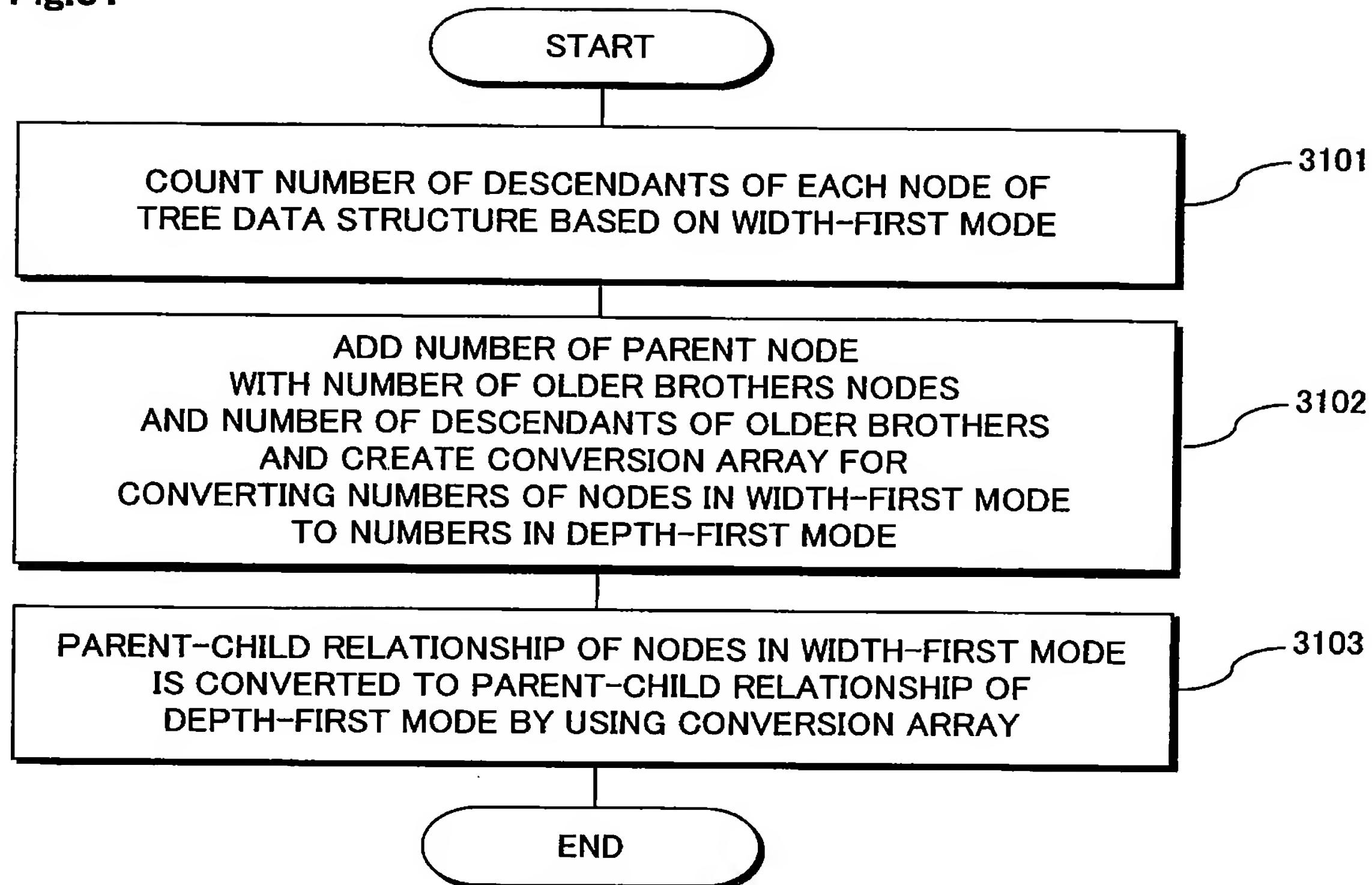


Fig.32

EXPRESSION BASED ON WIDTH-FIRST CHILD→PARENT	
C→P	NODE NUMBER ARRAY
0 -1	0 1
1 0	1 1
2 0	2 1
3 0	3 1
4 1	4 1
5 1	5 1
6 2	6 1
7 3	7 1
8 4	8 1
9 4	9 1
10 7	10 1
11 7	11 1

Fig.33

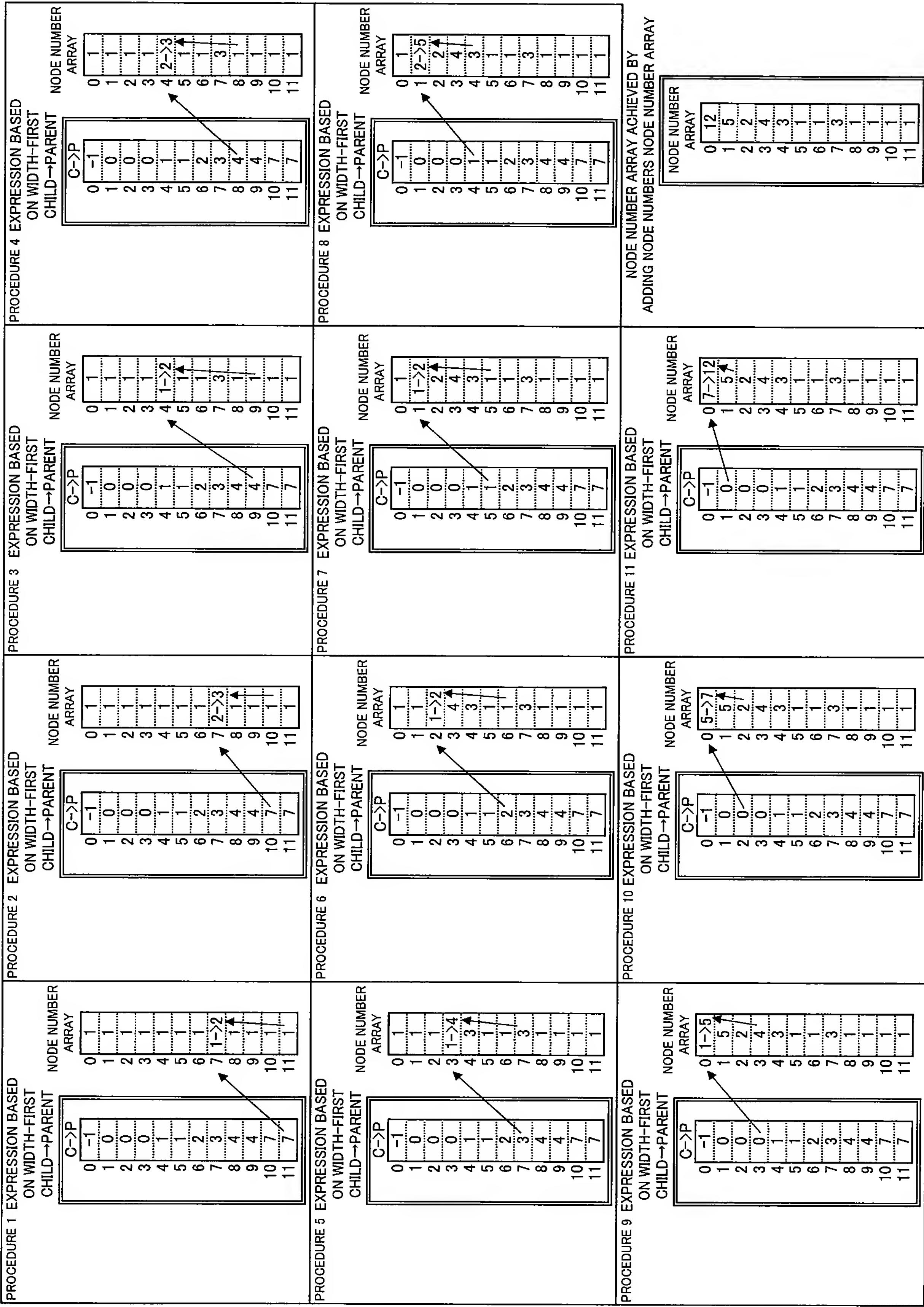
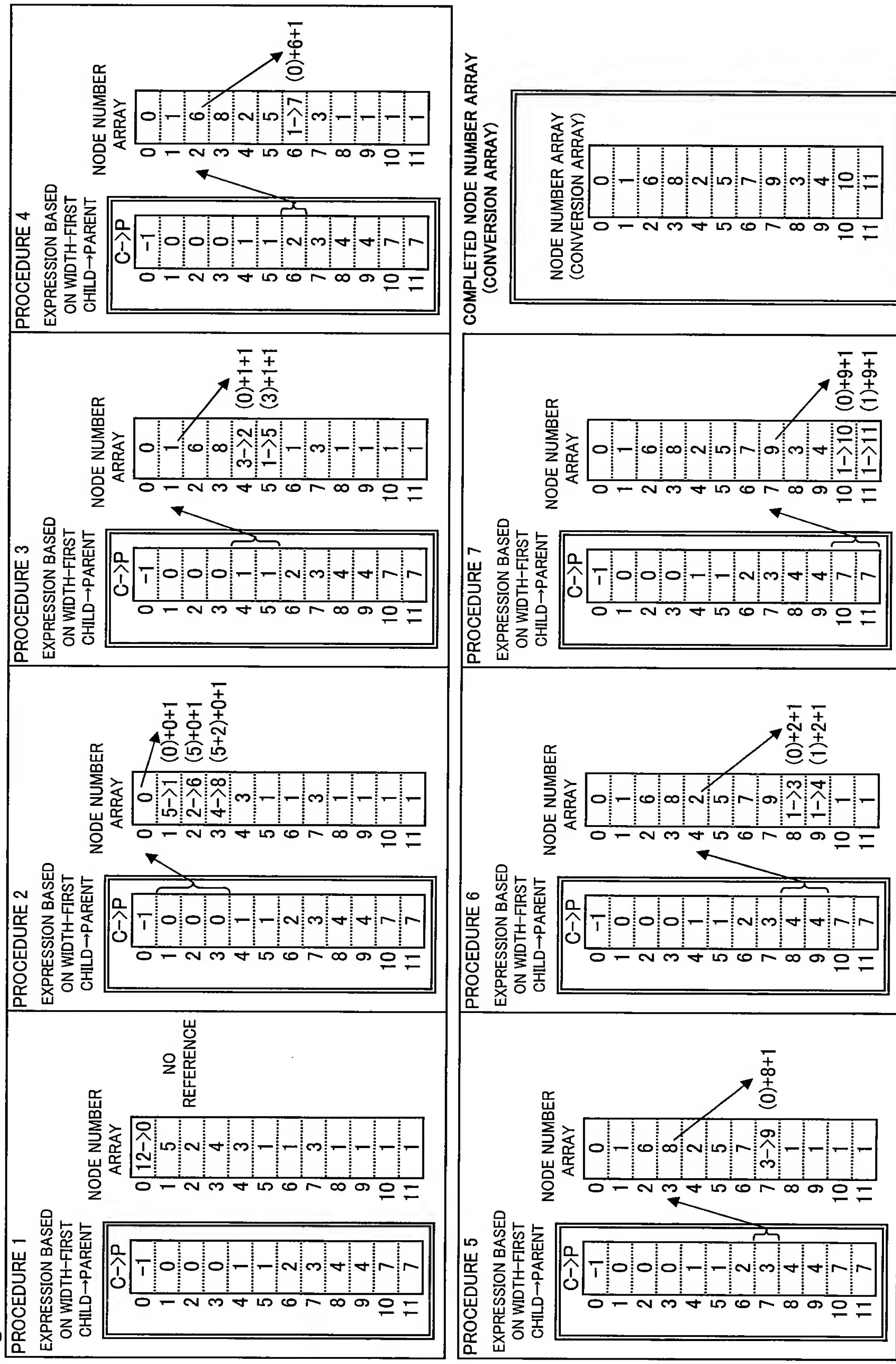


Fig.34



F.35

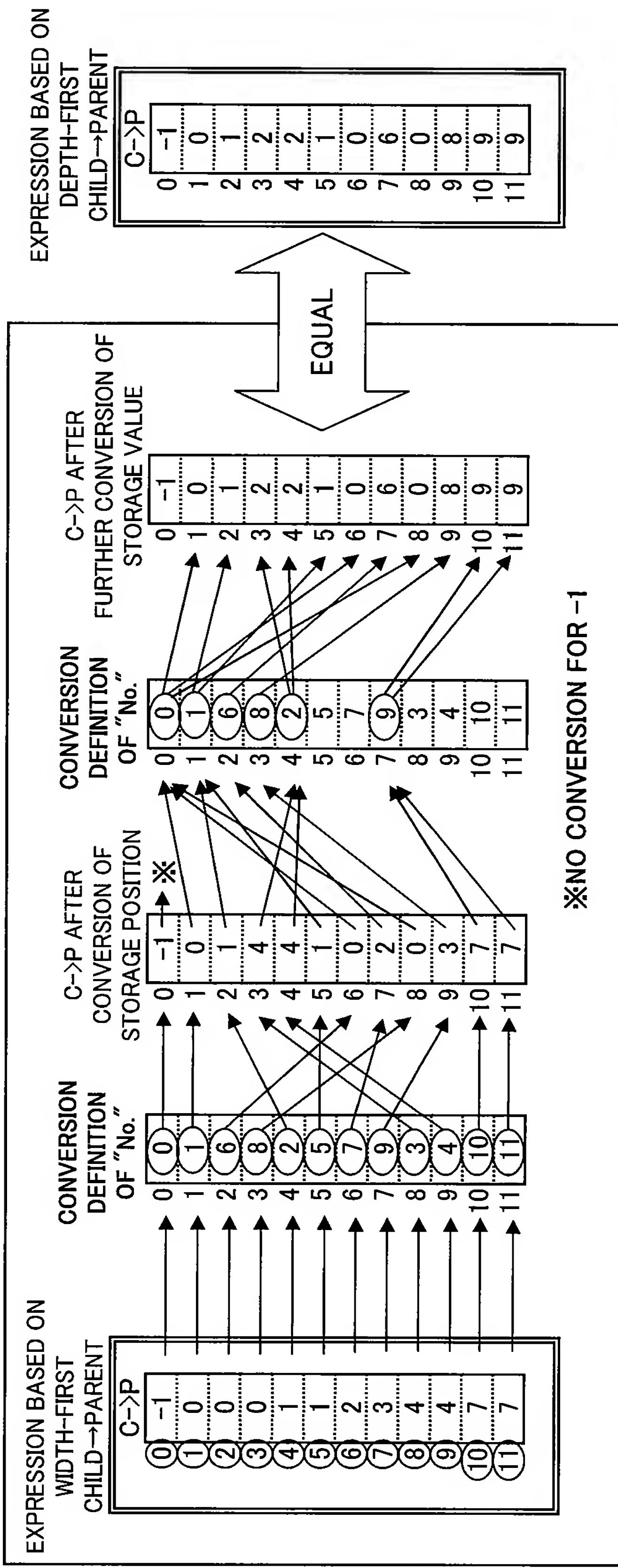


Fig.36

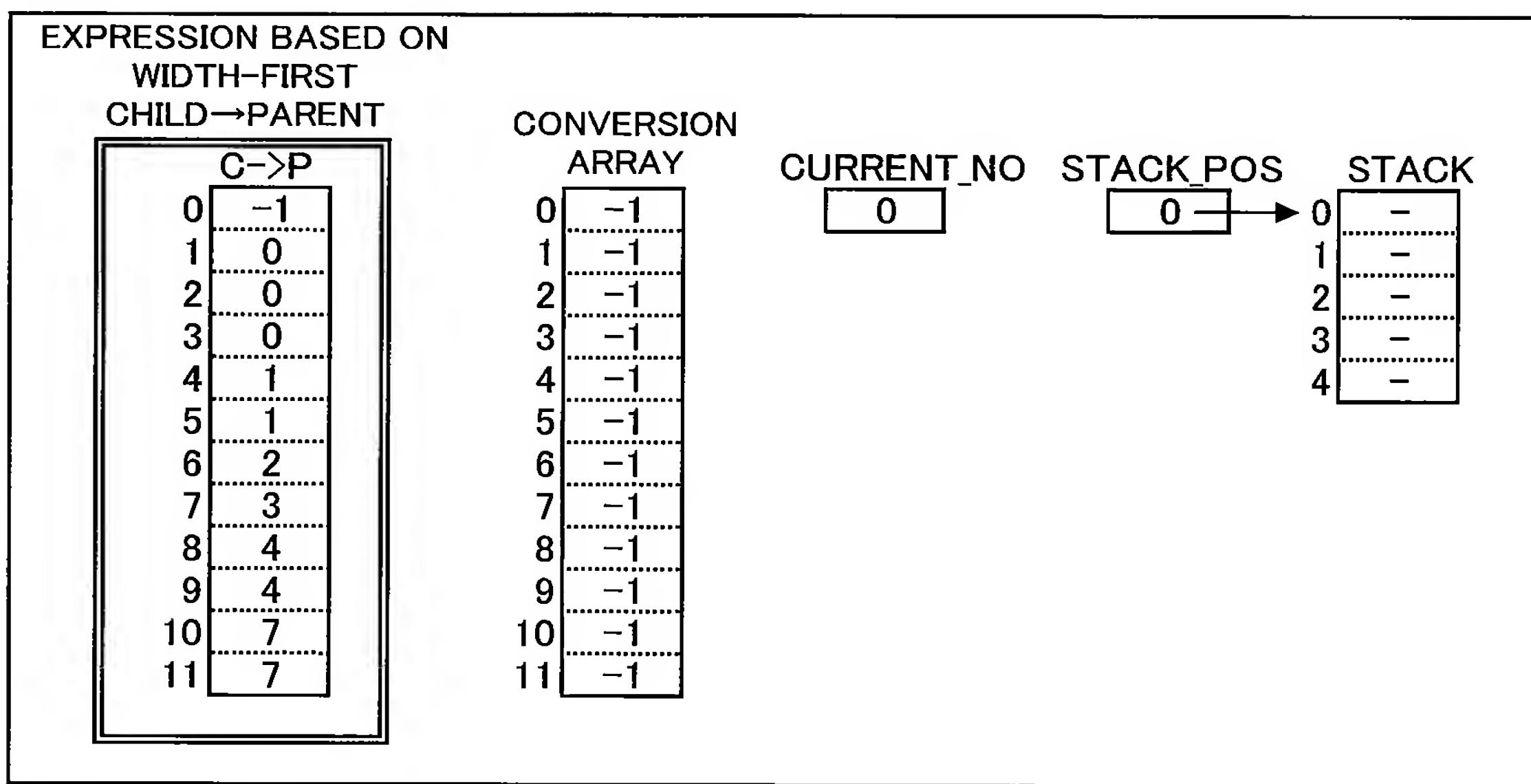


Fig.37A

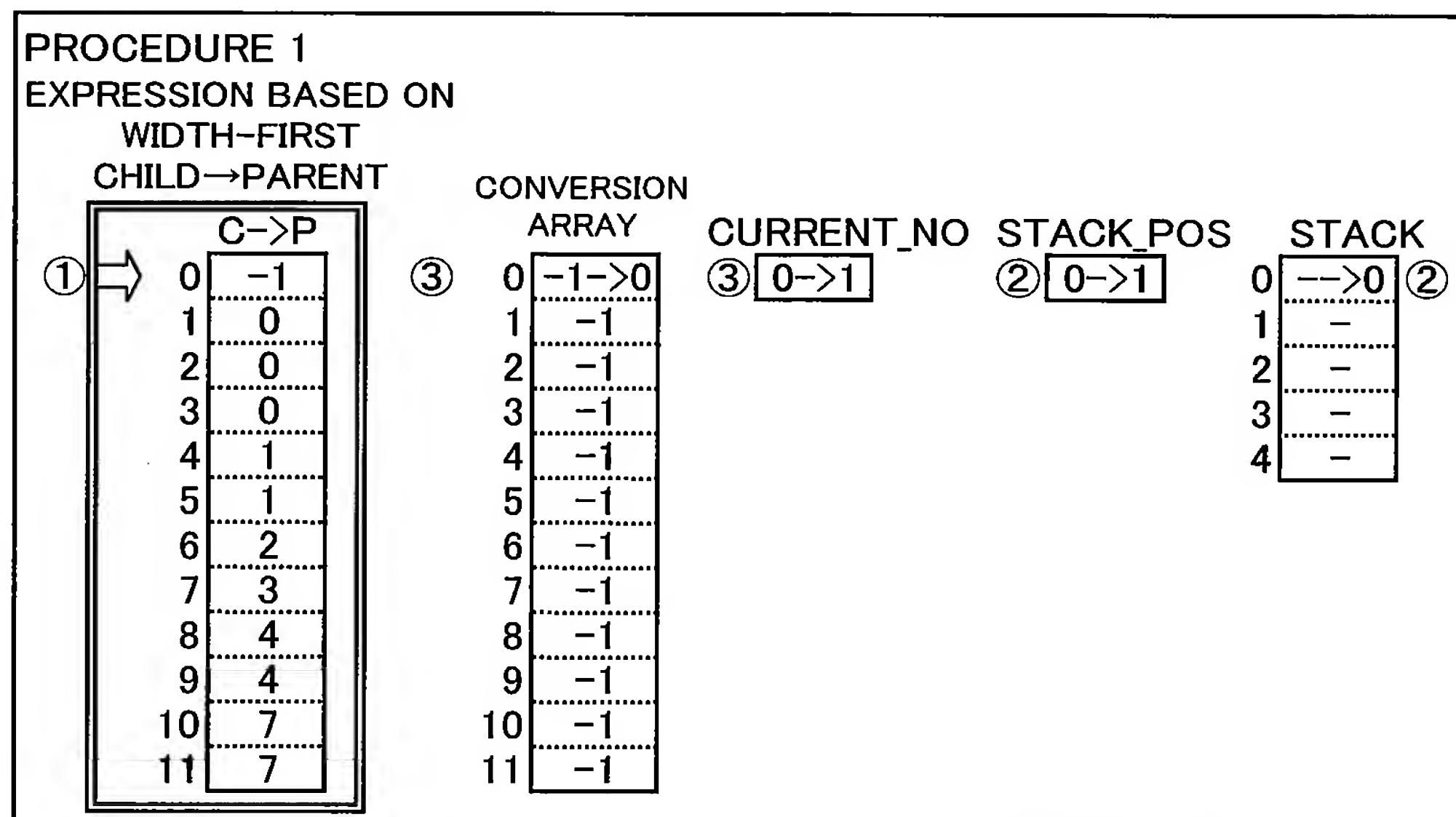


Fig.37B

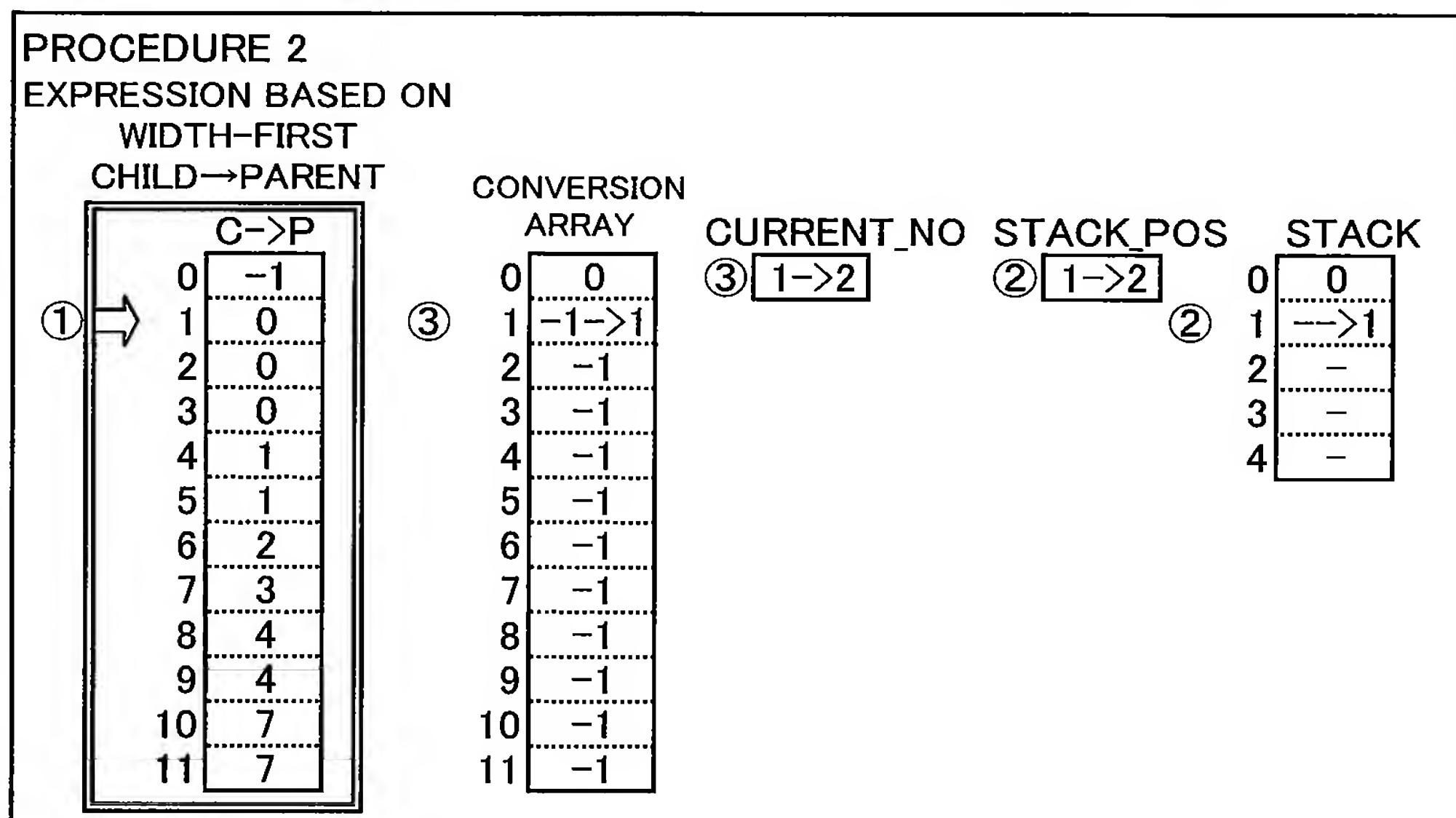


Fig.37C

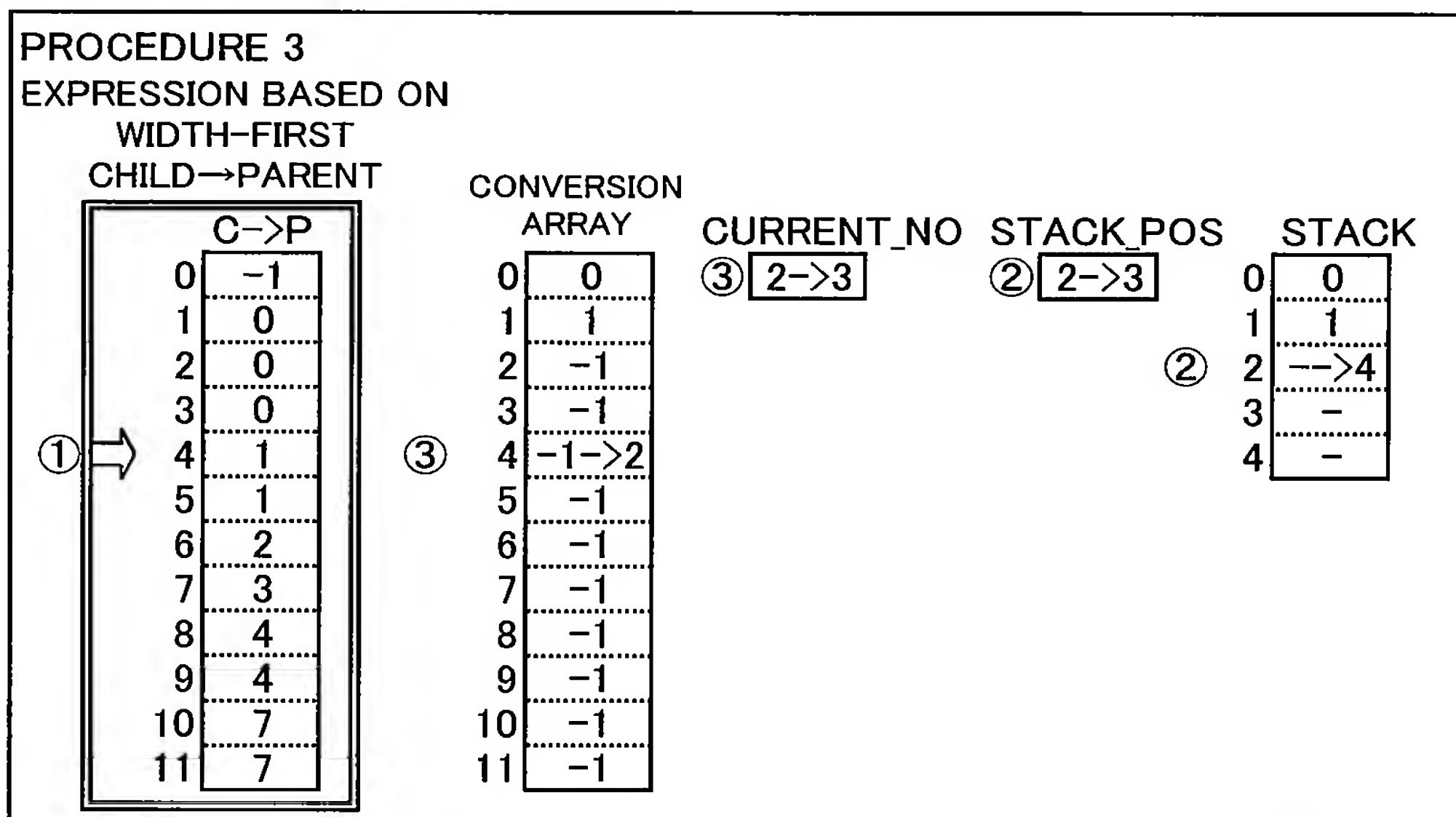


Fig.38A

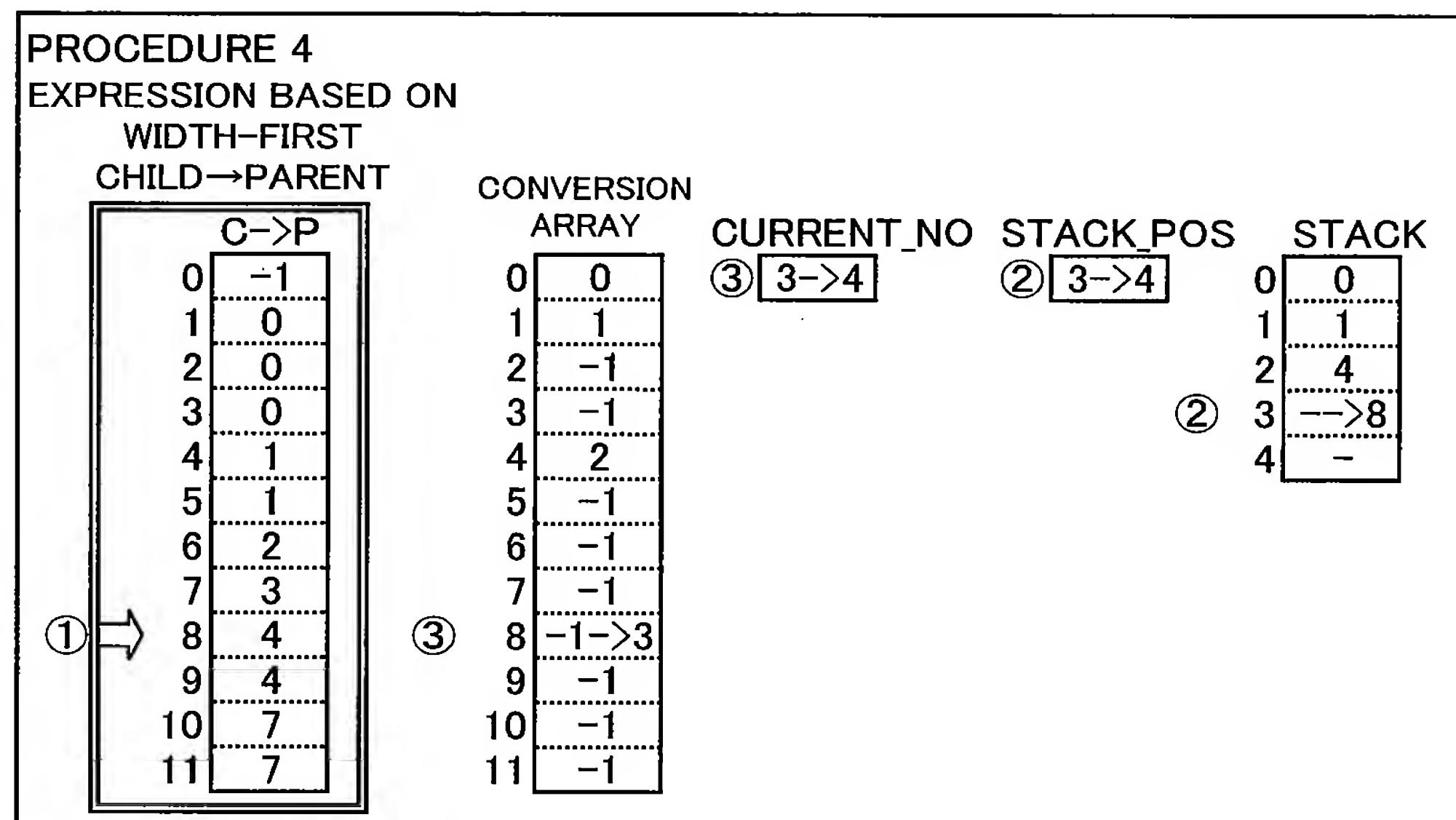


Fig.38B

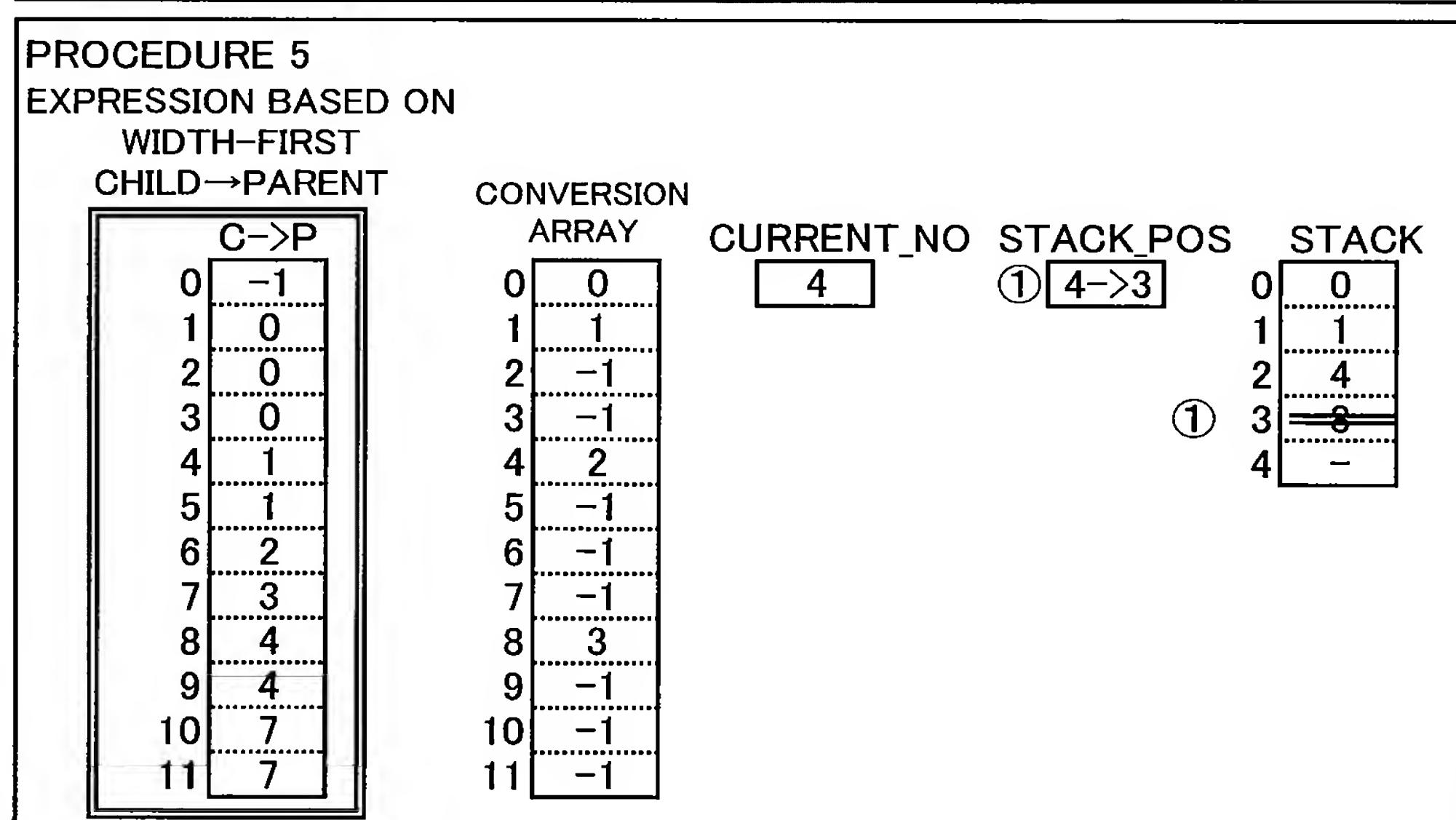


Fig.38C

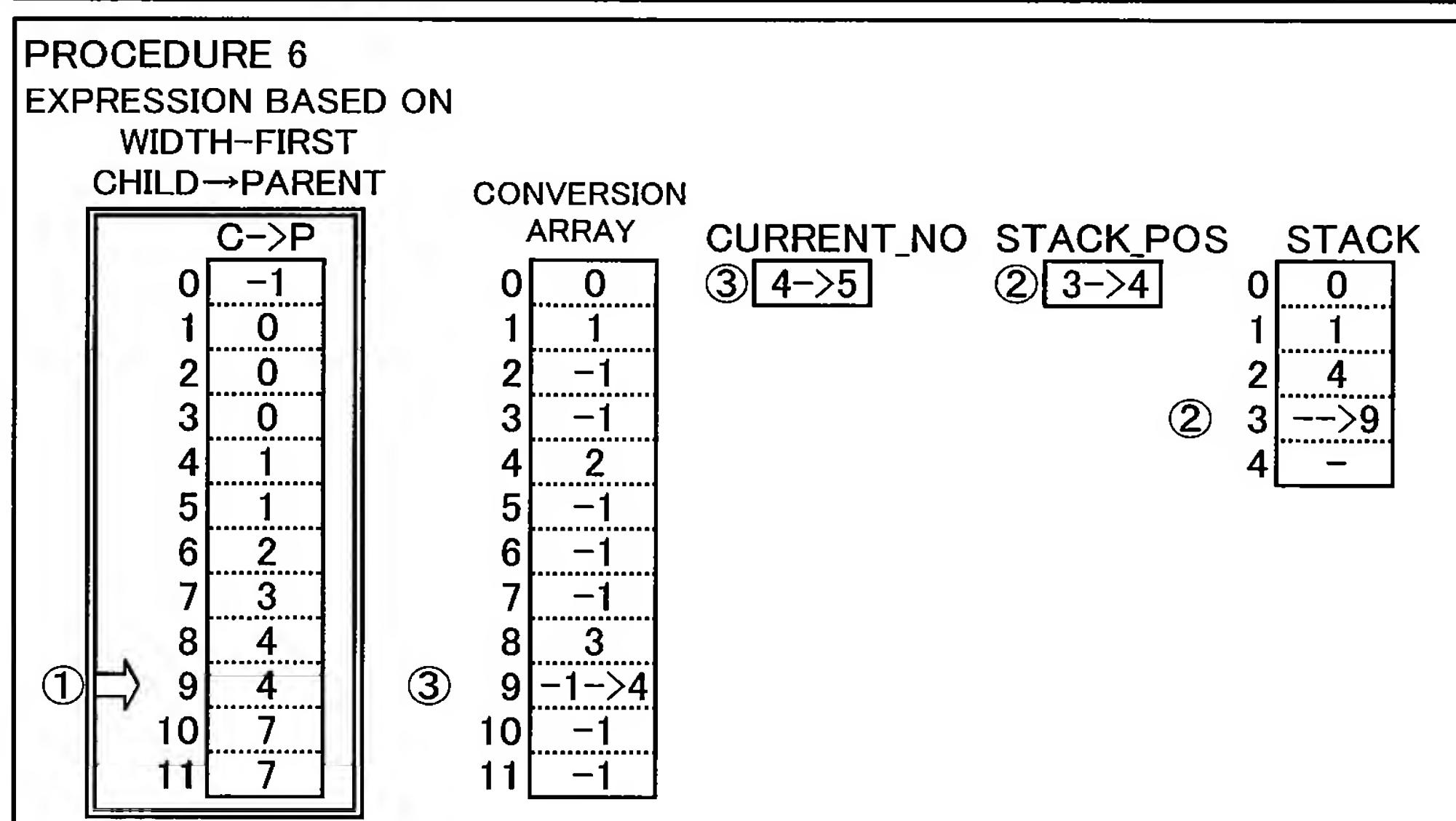


Fig.39A

PROCEDURE 7		EXPRESSION BASED ON WIDTH-FIRST CHILD→PARENT		
C→P		CONVERSION ARRAY	CURRENT_NO	STACK_POS
0	-1	0 0		
1	0	1 1		
2	0	2 -1		
3	0	3 -1		
4	1	4 2		
5	1	5 -1		
6	2	6 -1		
7	3	7 -1		
8	4	8 3		
9	4	9 4		
10	7	10 -1		
11	7	11 -1		

Fig.39B

PROCEDURE 8		EXPRESSION BASED ON WIDTH-FIRST CHILD→PARENT		
C→P		CONVERSION ARRAY	CURRENT_NO	STACK_POS
0	-1	0 0		
1	0	1 1		
2	0	2 -1		
3	0	3 -1		
4	1	4 2		
5	1	5 -1		
6	2	6 -1		
7	3	7 -1		
8	4	8 3		
9	4	9 4		
10	7	10 -1		
11	7	11 -1		

Fig.39C

PROCEDURE 9		EXPRESSION BASED ON WIDTH-FIRST CHILD→PARENT		
C→P		CONVERSION ARRAY	CURRENT_NO	STACK_POS
0	-1	0 0		
1	0	1 1		
2	0	2 -1		
3	0	3 -1		
4	1	4 2		
5	1	5 -1->5		
6	2	6 -1		
7	3	7 -1		
8	4	8 3		
9	4	9 4		
10	7	10 -1		
11	7	11 -1		

Fig.40A

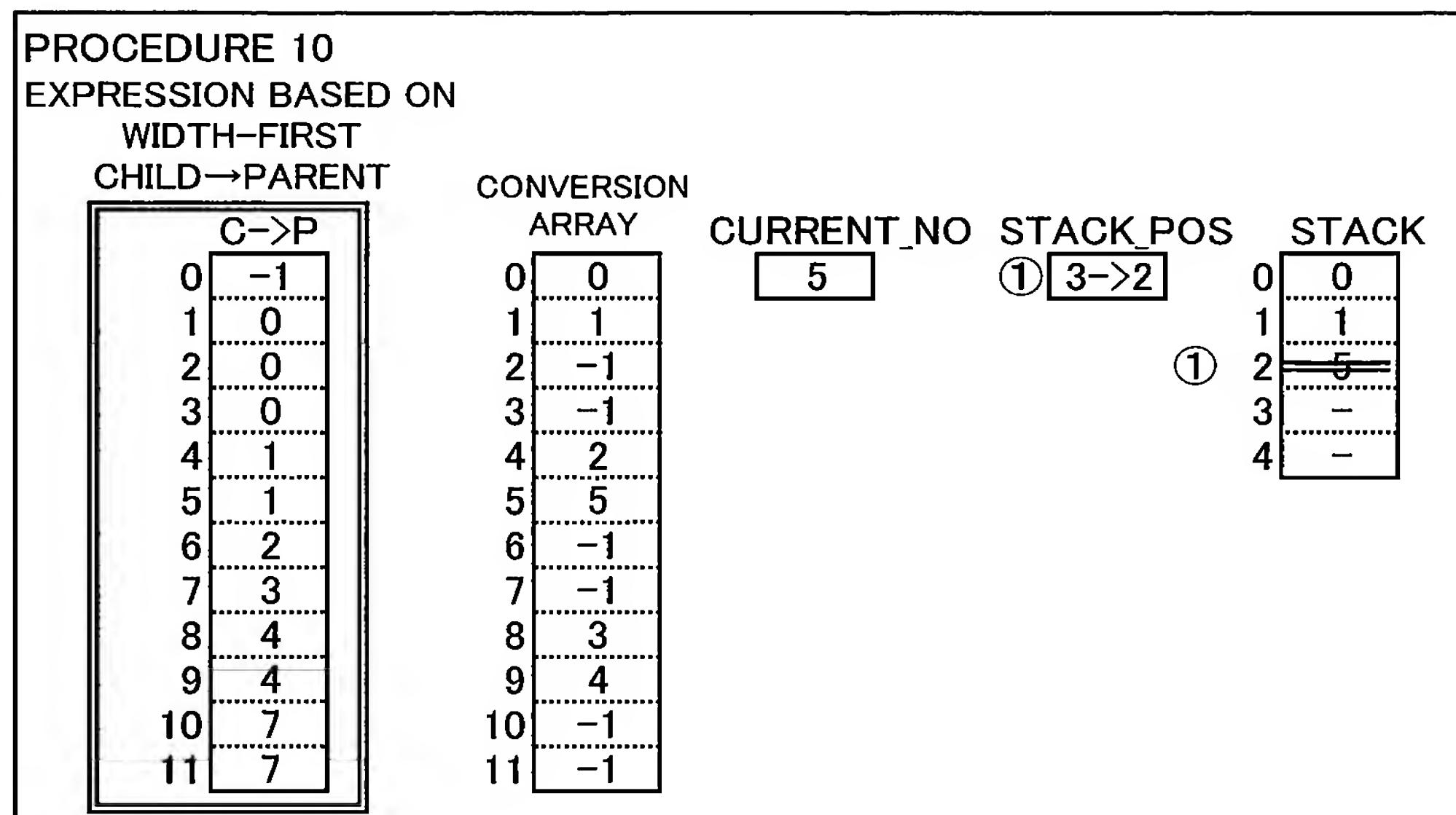


Fig.40B

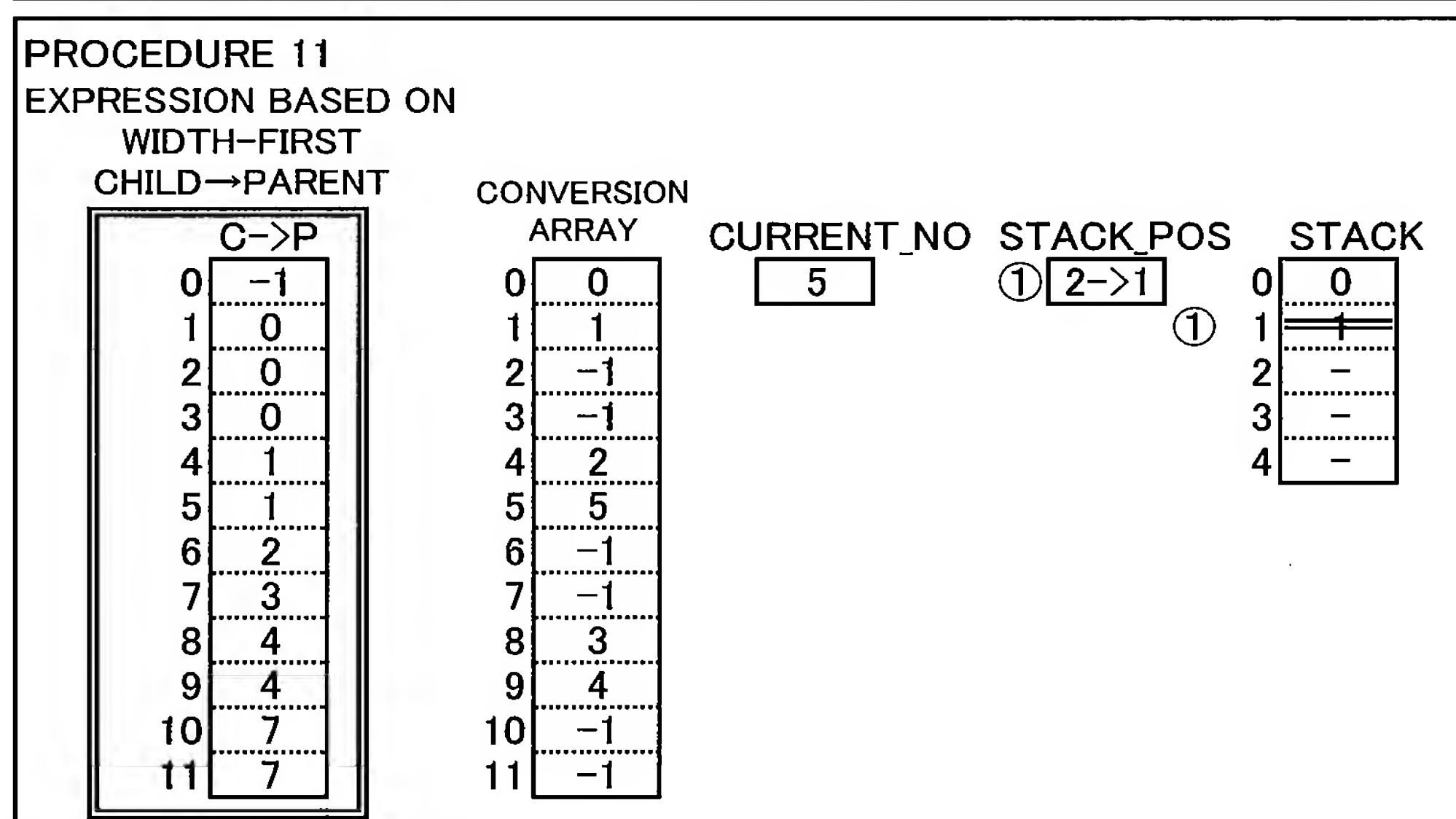


Fig.40C

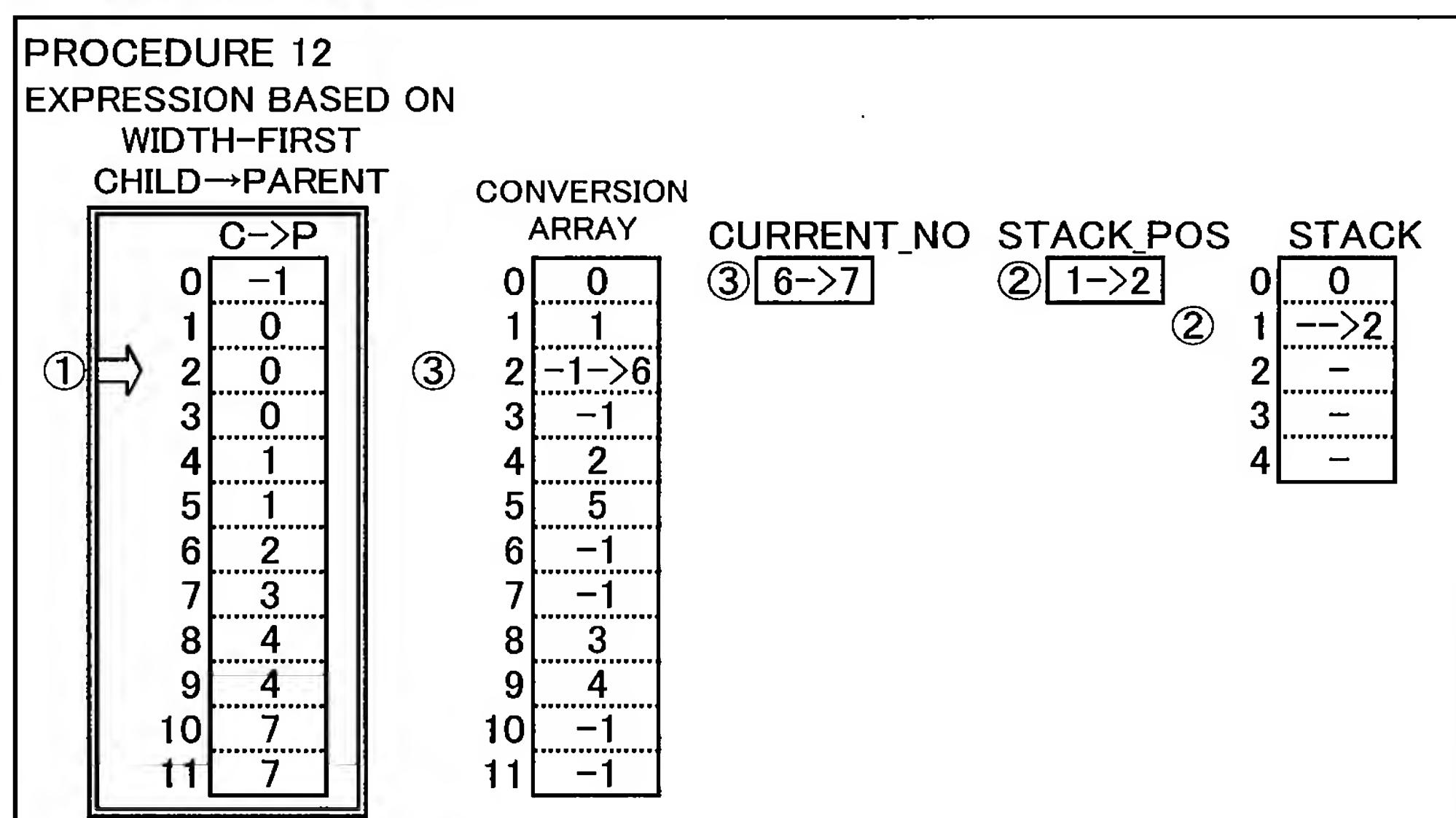


Fig.41A

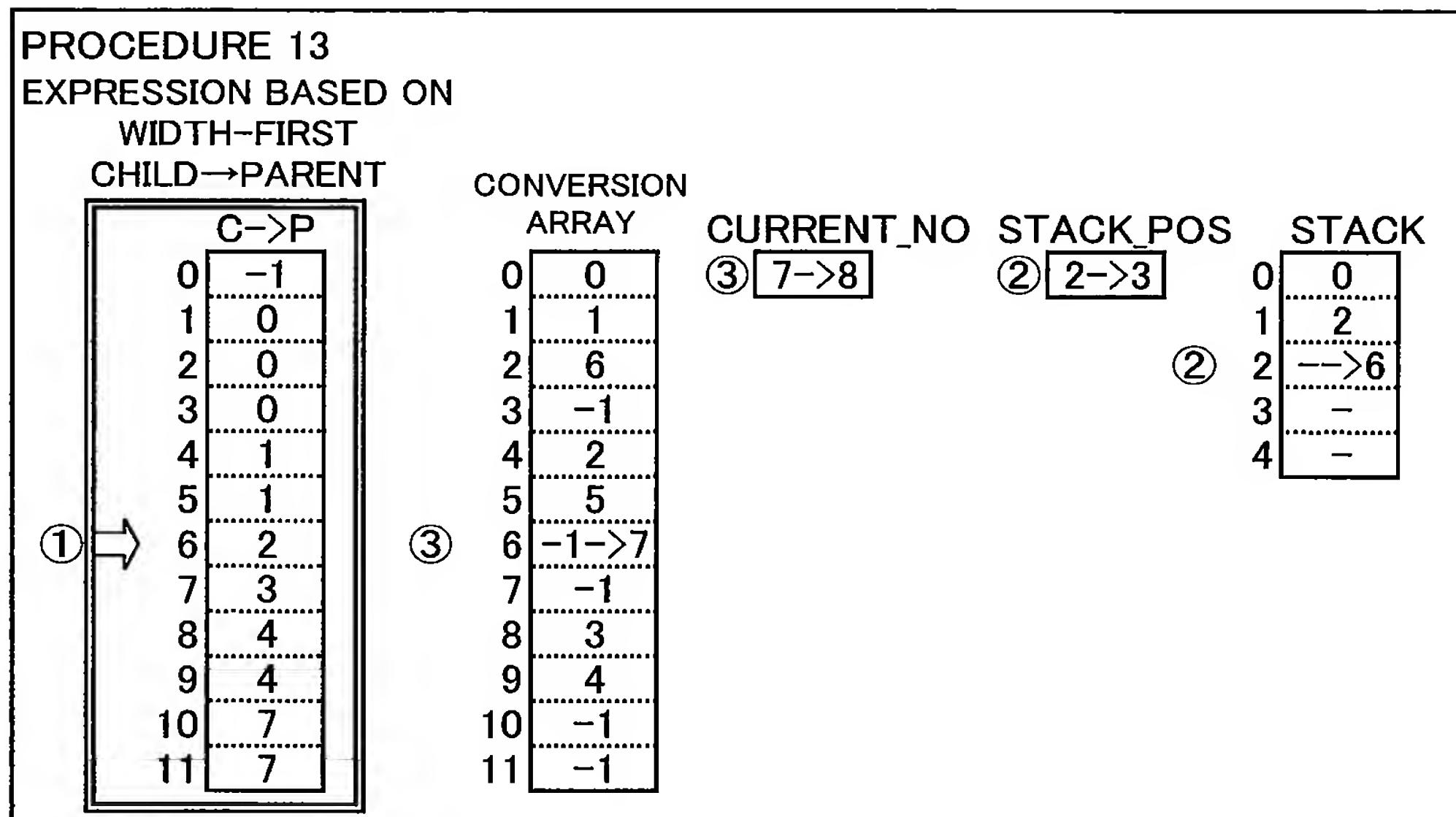


Fig.41B

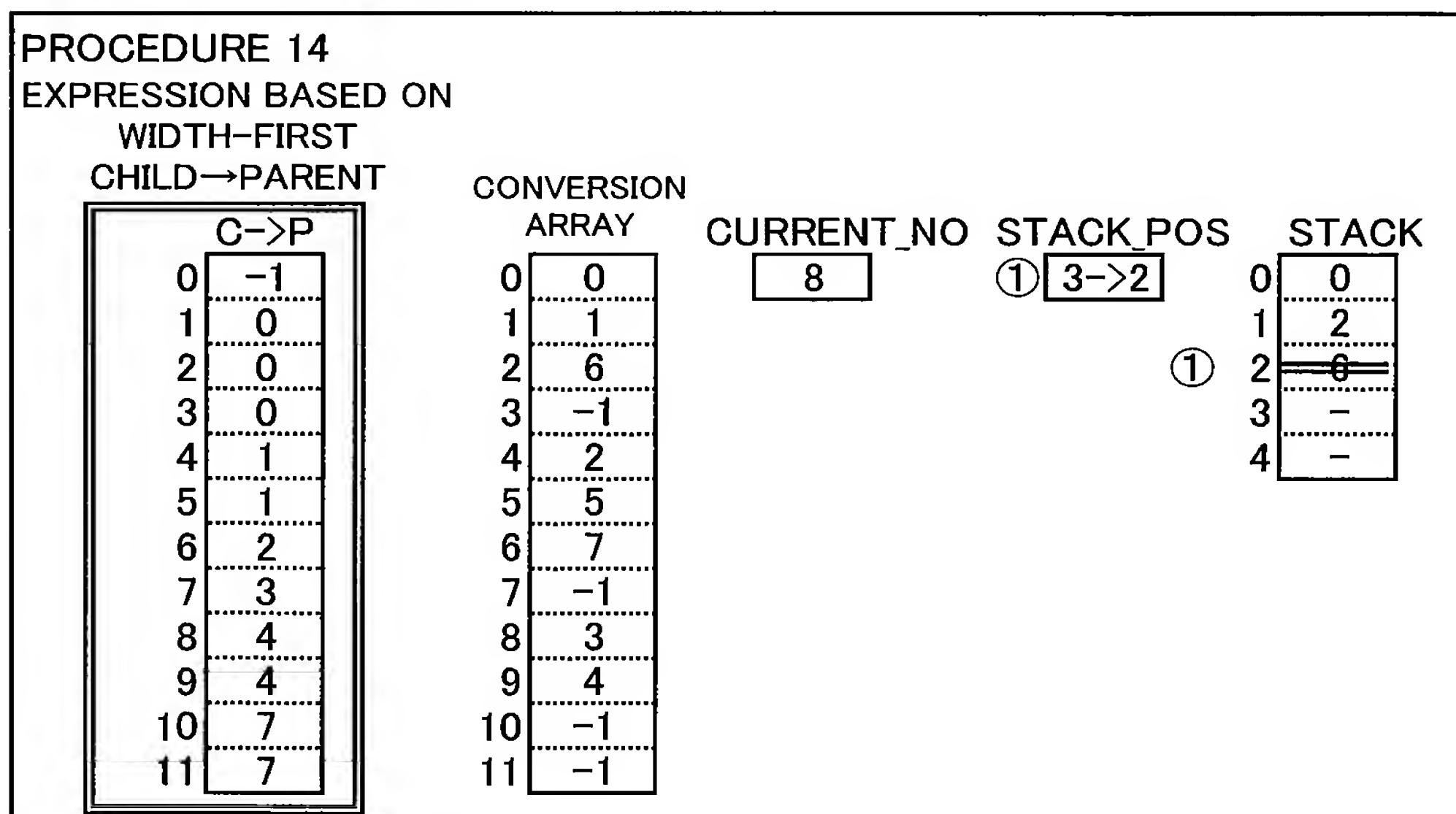


Fig.41C

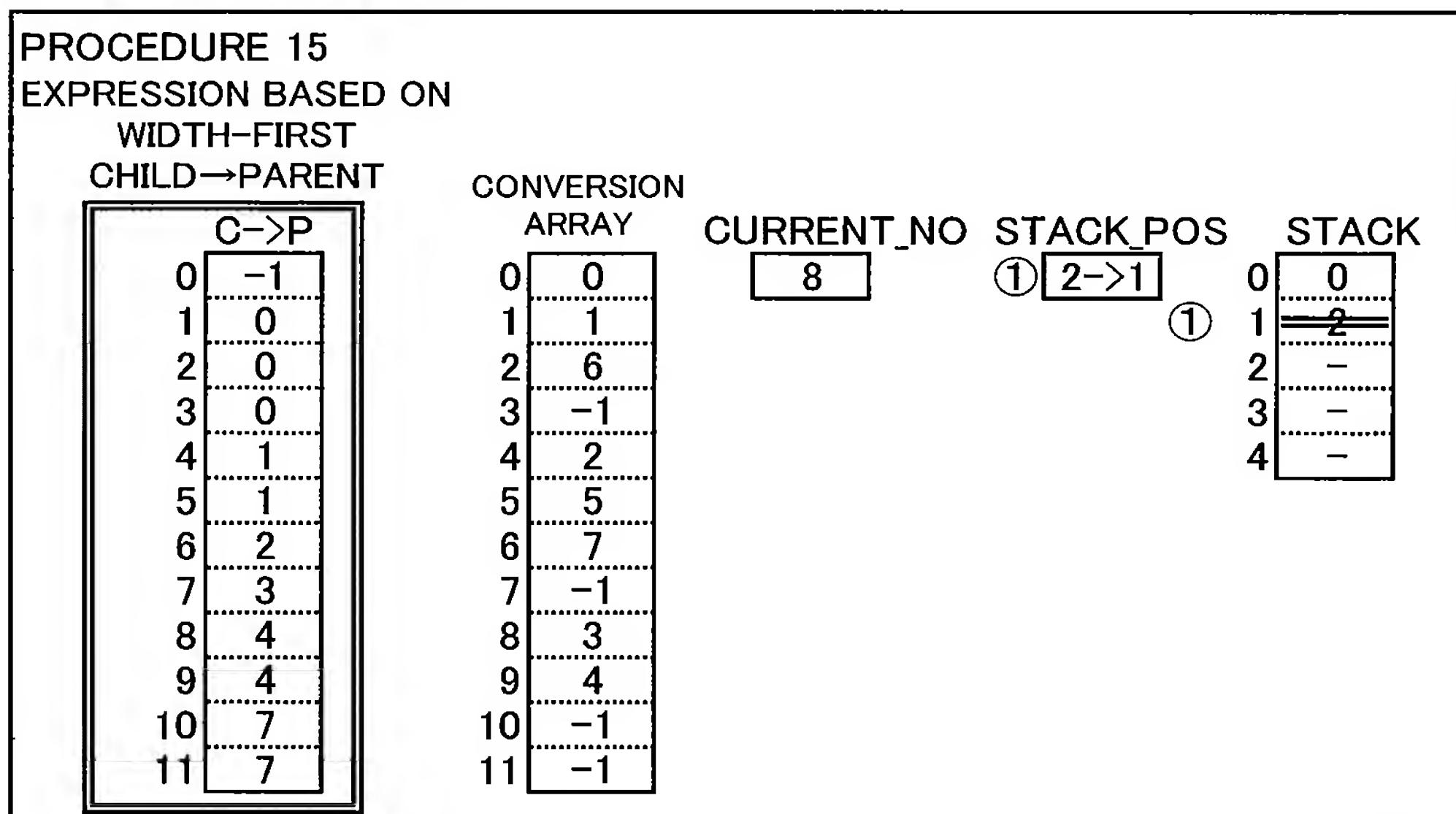


Fig.42A

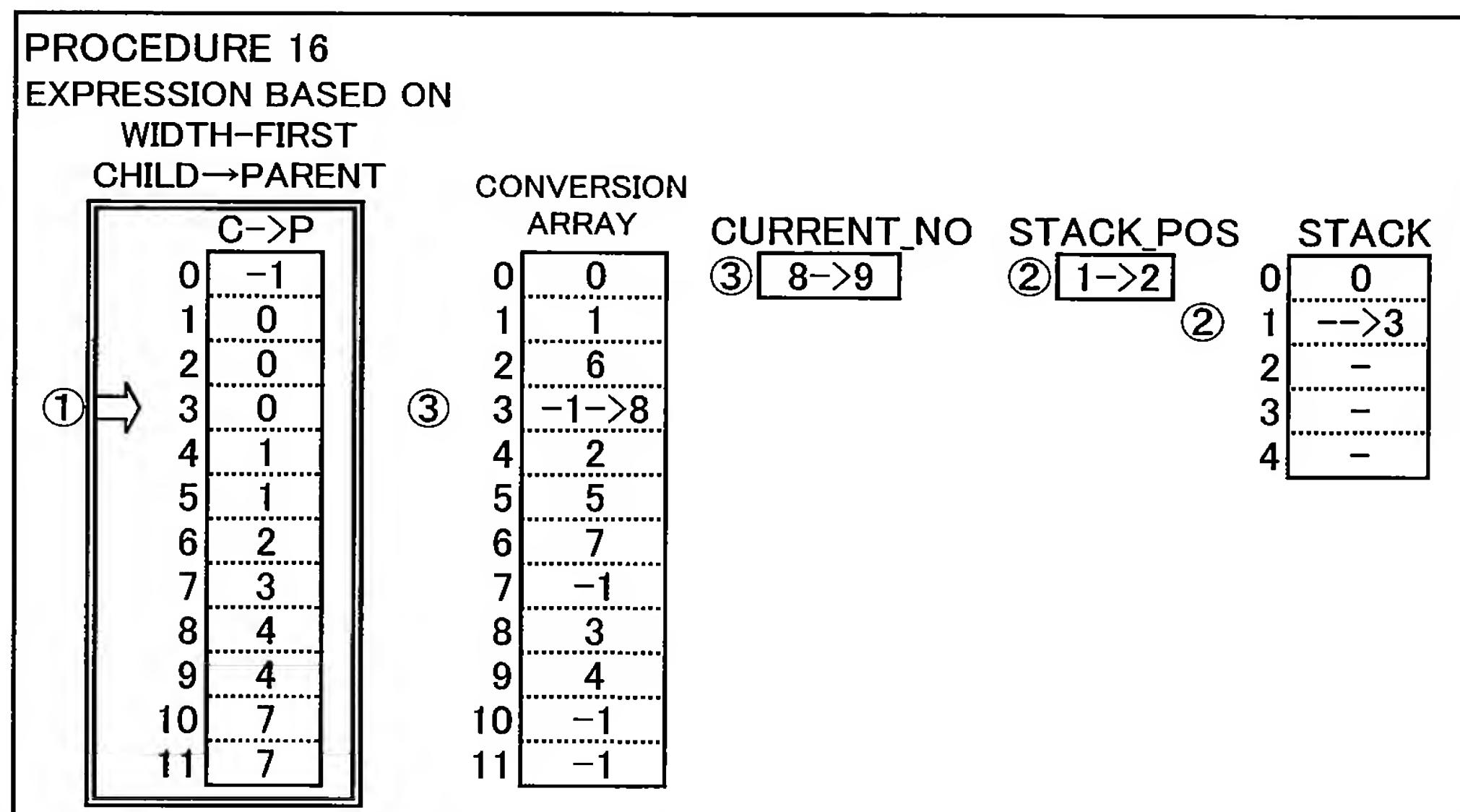


Fig.42B

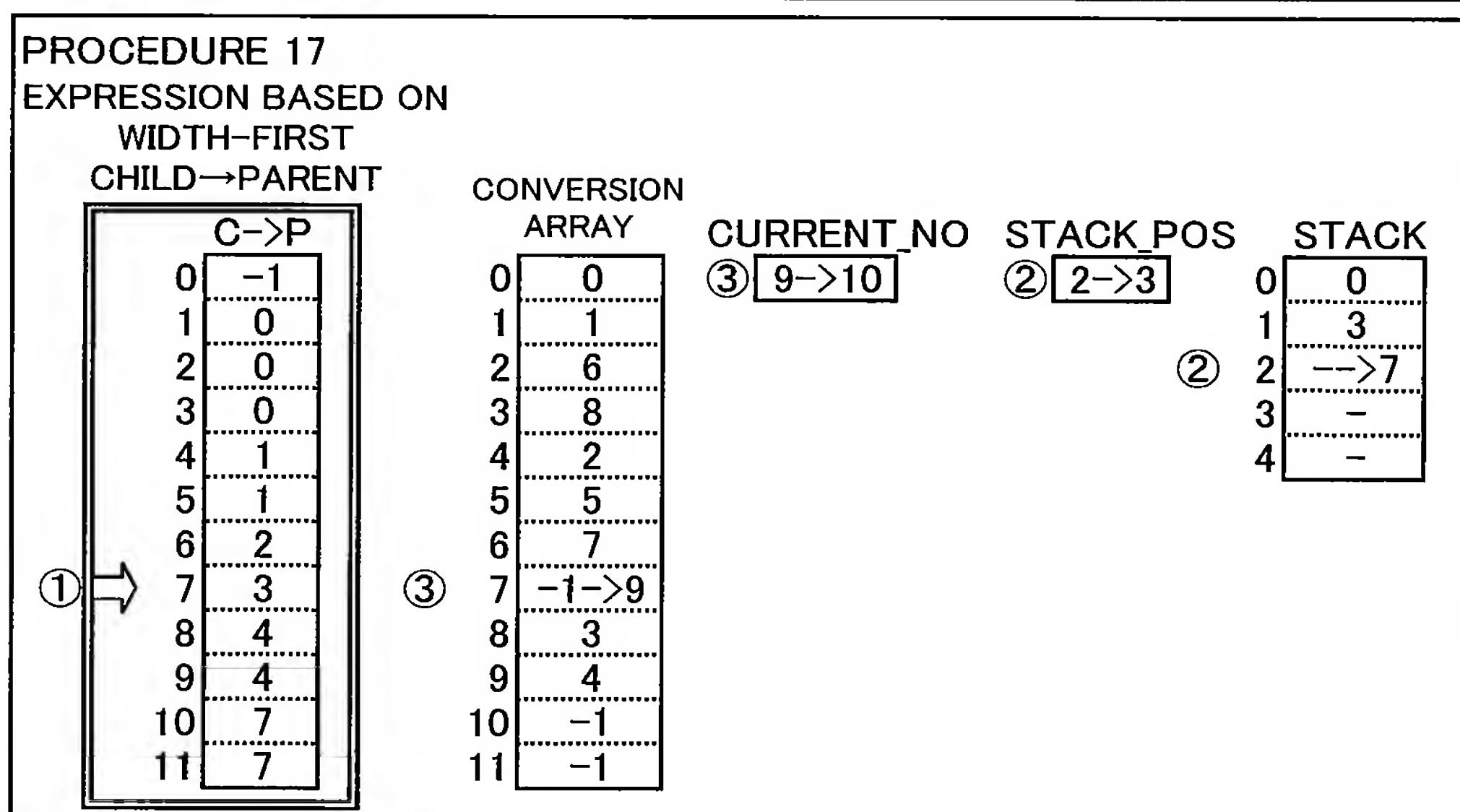


Fig.42C

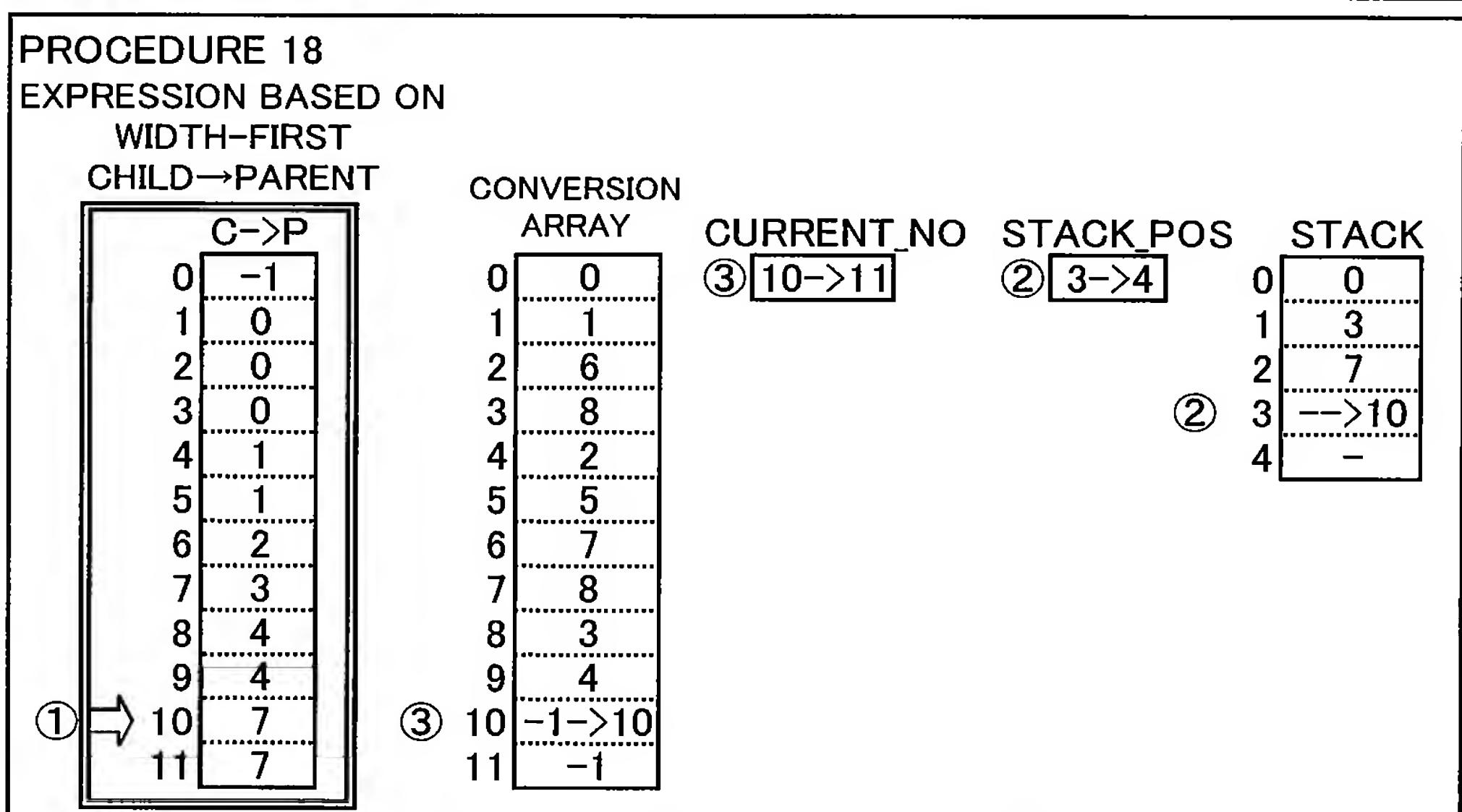


Fig.43A

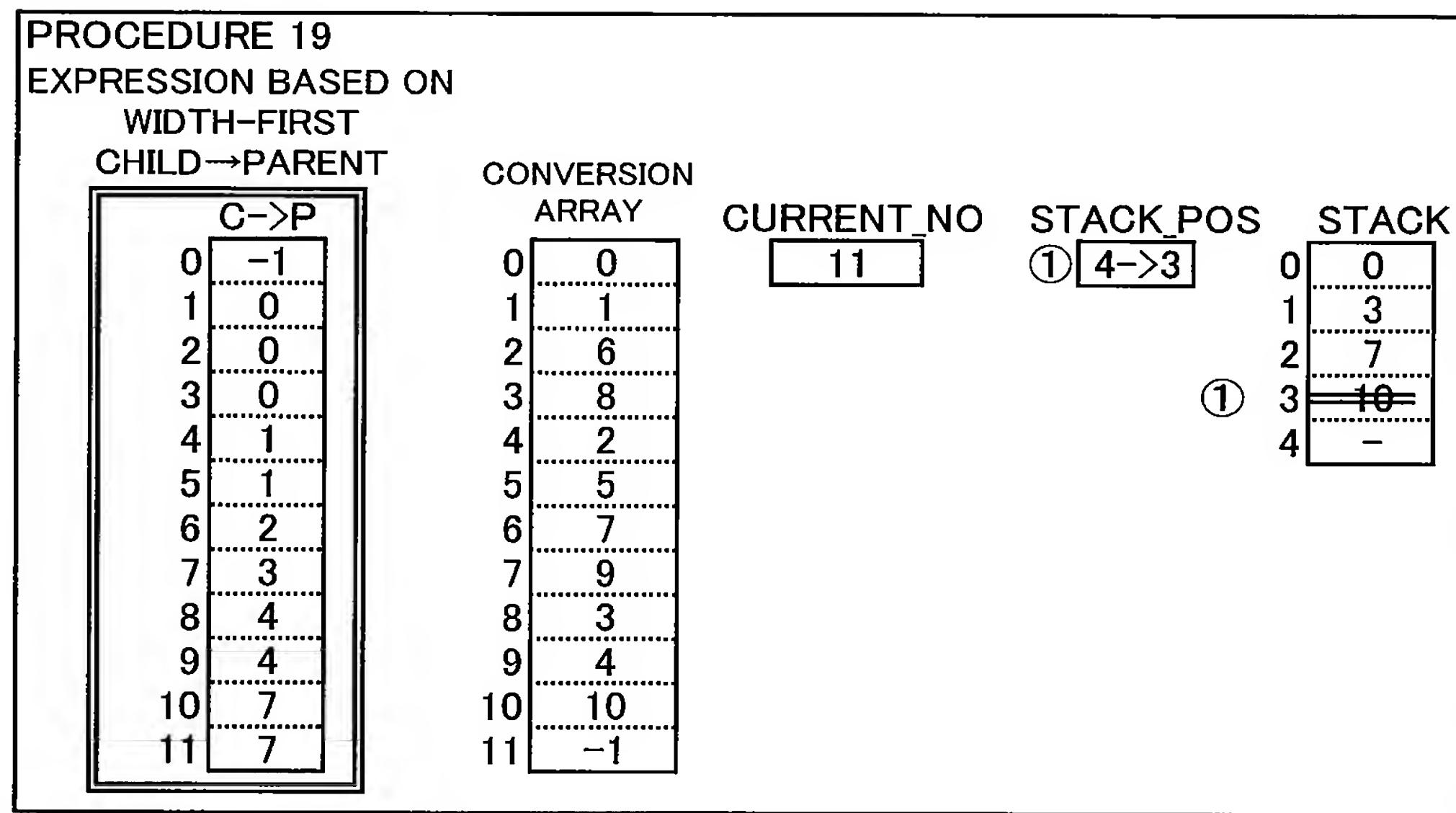


Fig.43B

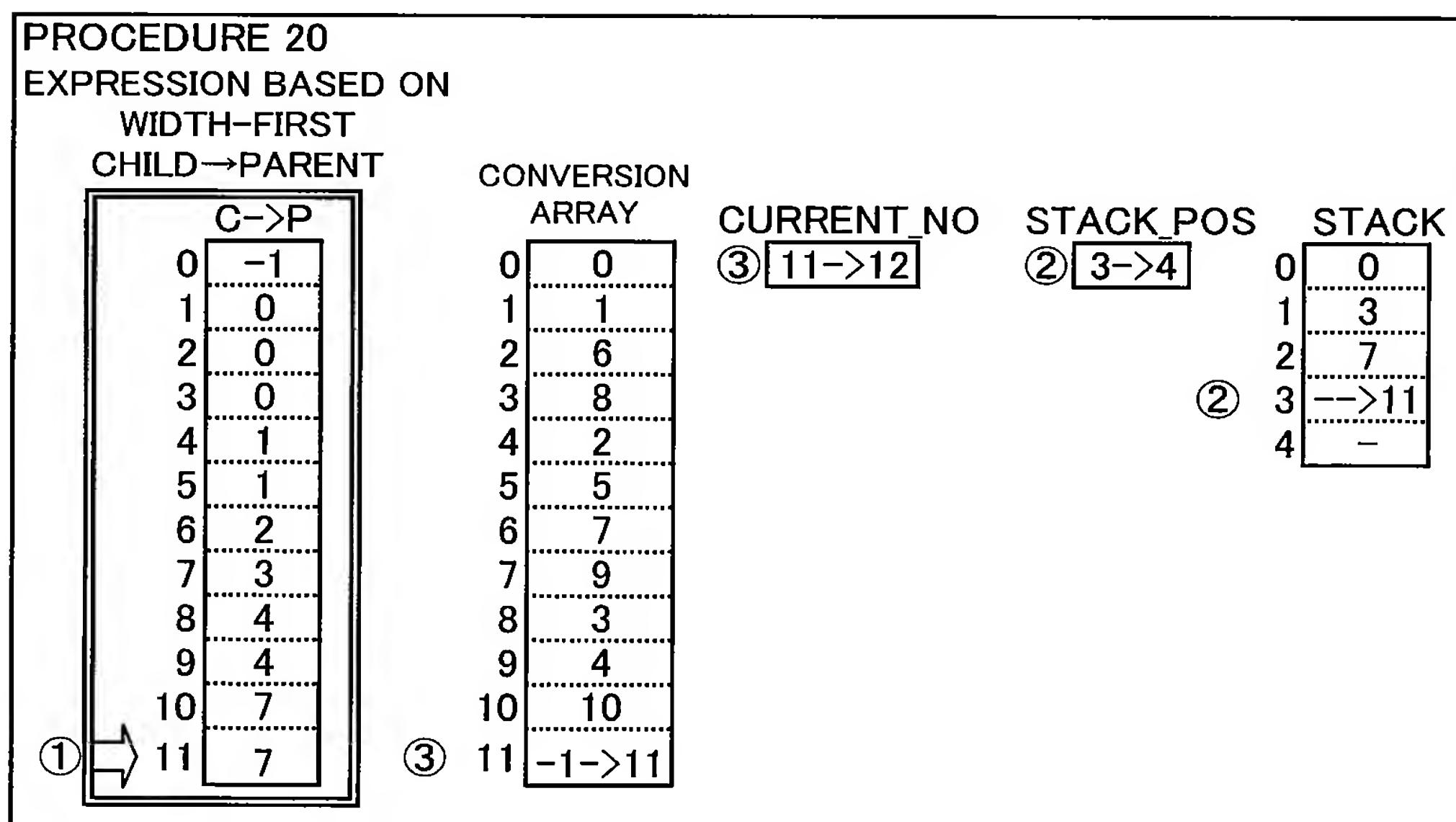


Fig.44

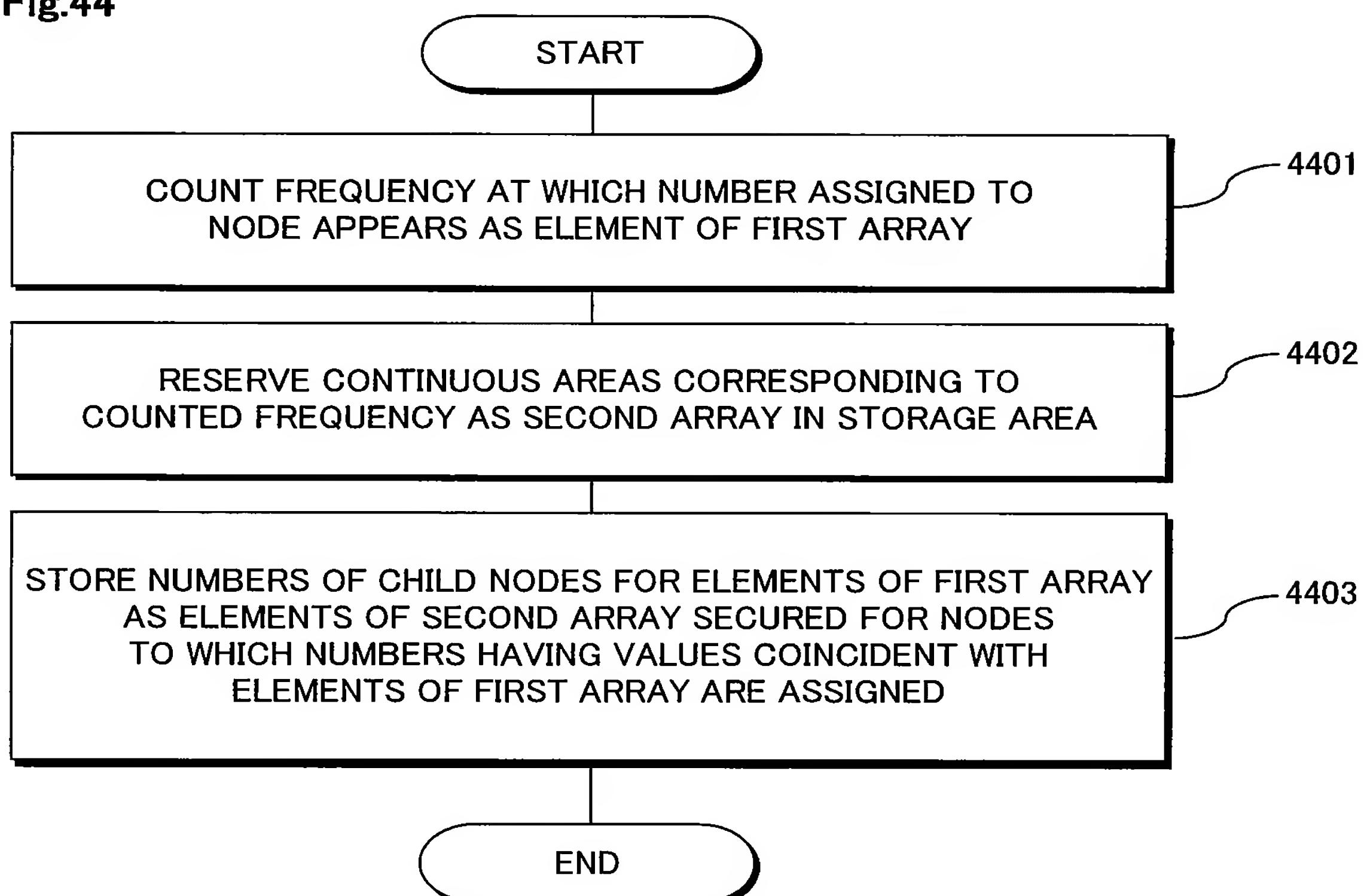


Fig.45A

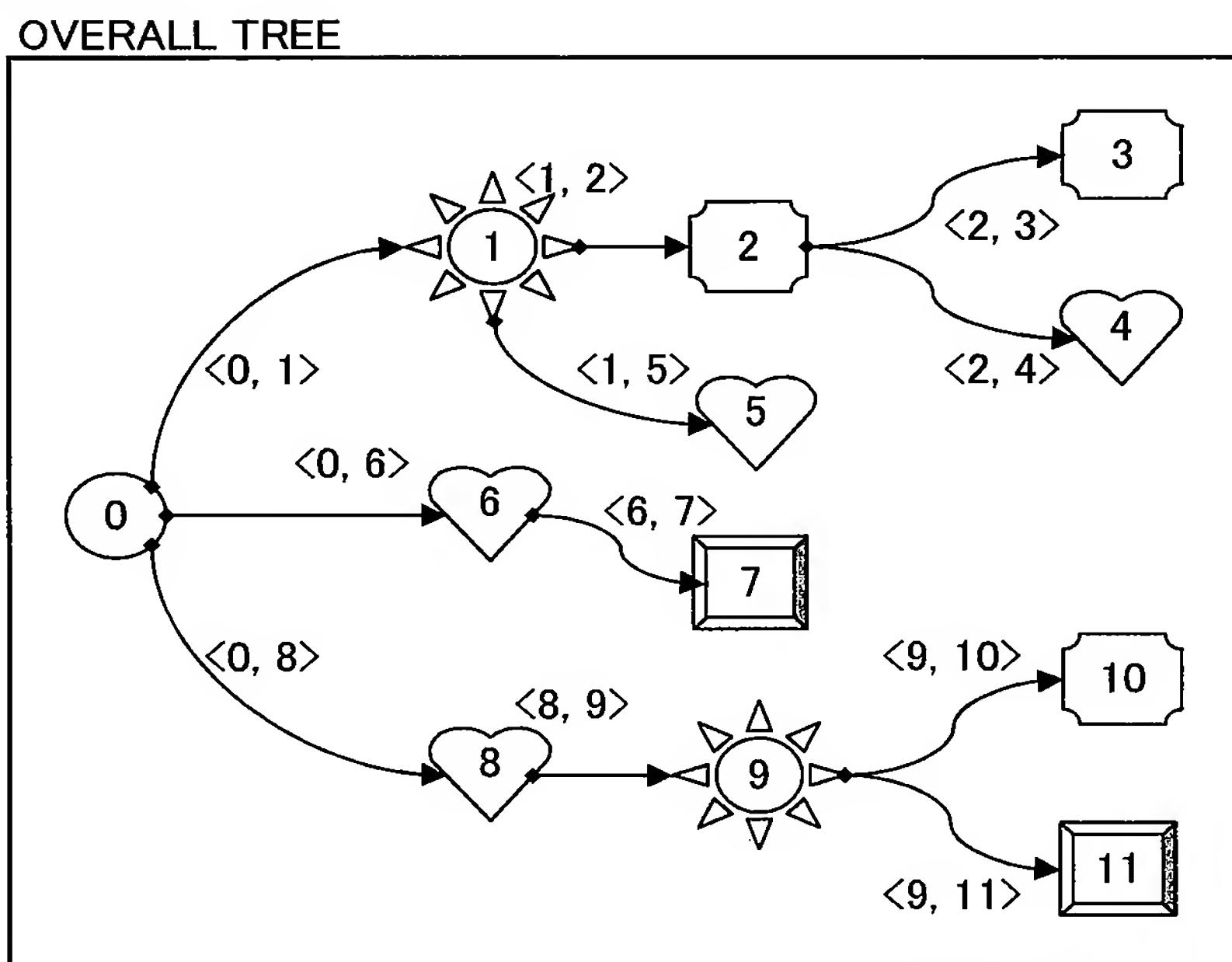


Fig.45B

EXPRESSION BASED ON
CHILD→PARENT

0	-1
1	0
2	1
3	2
4	2
5	1
6	0
7	6
8	0
9	8
10	9
11	9

Fig.45C

EXPRESSION BASED ON
PARENT→CHILD

Aggr.	P→C	
	0	1
0	0	1
1	3	6
2	5	8
3	7	2
4	7	5
5	7	3
6	7	4
7	8	7
8	8	9
9	9	10
10	11	10
11	11	11

Fig.46A

PROCEDURE 1: RESERVATION OF AREA AND INITIALIZATION

EXPRESSION BASED ON
CHILD→PARENT

C→P	
0	-1
1	0
2	1
3	2
4	2
5	1
6	0
7	6
8	0
9	8
10	9
11	9

Aggr		P→C	
0	0	0	-1
1	0	1	-1
2	0	2	-1
3	0	3	-1
4	0	4	-1
5	0	5	-1
6	0	6	-1
7	0	7	-1
8	0	8	-1
9	0	9	-1
10	0	10	-1
11	0		

Fig.46B

PROCEDURE 2: COUNT OF EXISTENCE NUMBER

EXPRESSION BASED ON
CHILD→PARENT

C→P	
0	(-1)
1	0
2	1
3	2
4	2
5	1
6	0
7	6
8	0
9	8
10	9
11	9

Aggr		P→C	
0	0→1	0	-1
1	0→1	1	-1
2	0	2	-1
3	0	3	-1
4	0	4	-1
5	0	5	-1
6	0	6	-1
7	0	7	-1
8	0	8	-1
9	0	9	-1
10	0	10	-1
11	0		

COMPLETION
OF
COUNT-UP

Aggr		P→C	
0	3	0	-1
1	2	1	-1
2	2	2	-1
3	0	3	-1
4	0	4	-1
5	0	5	-1
6	1	6	-1
7	0	7	-1
8	1	8	-1
9	2	9	-1
10	0	10	-1
11	0		

Fig.46C

PROCEDURE 3: CONVERSION OF EXISTENCE NUMBER TO ACCUMULATIVE TOTAL

EXPRESSION BASED ON
CHILD→PARENT

C→P	
0	-1
1	0
2	1
3	2
4	2
5	1
6	0
7	6
8	0
9	8
10	9
11	9

Aggr		Aggr		P→C	
0	3	0	0	0	-1
1	2	1	3	1	-1
2	2	2	5	2	-1
3	0	3	7	3	-1
4	0	4	7	4	-1
5	0	5	7	5	-1
6	1	6	7	6	-1
7	0	7	8	7	-1
8	1	8	8	8	-1
9	2	9	9	9	-1
10	0	10	11	10	-1
11	0	11	11		

Fig.47A

PROCEDURE 4: TRANSMISSION OF NODE NUMBER

EXPRESSION BASED ON
CHILD→PARENT

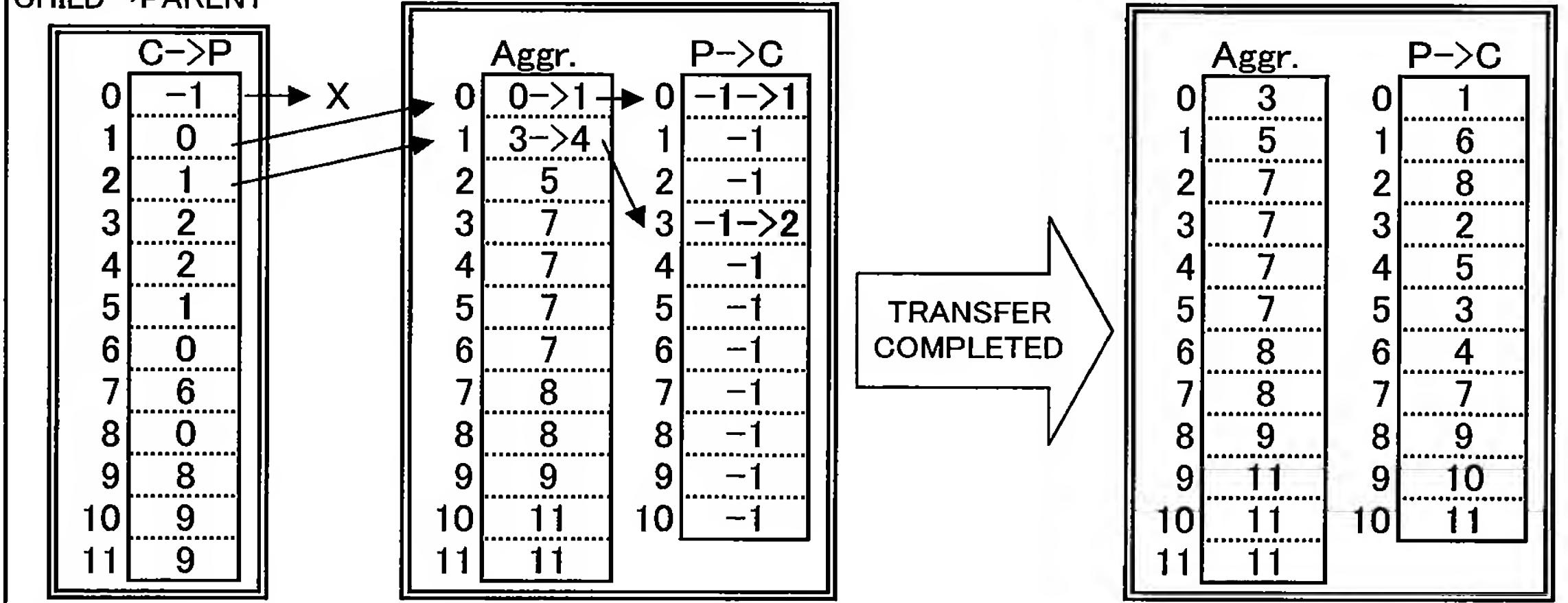


Fig.47B

PROCEDURE 5: RETURN OF ARRAY Aggr TO STATE
BEFORE NODE NUMBER IS TRANSFERRED

EXPRESSION BASED ON
CHILD→PARENT

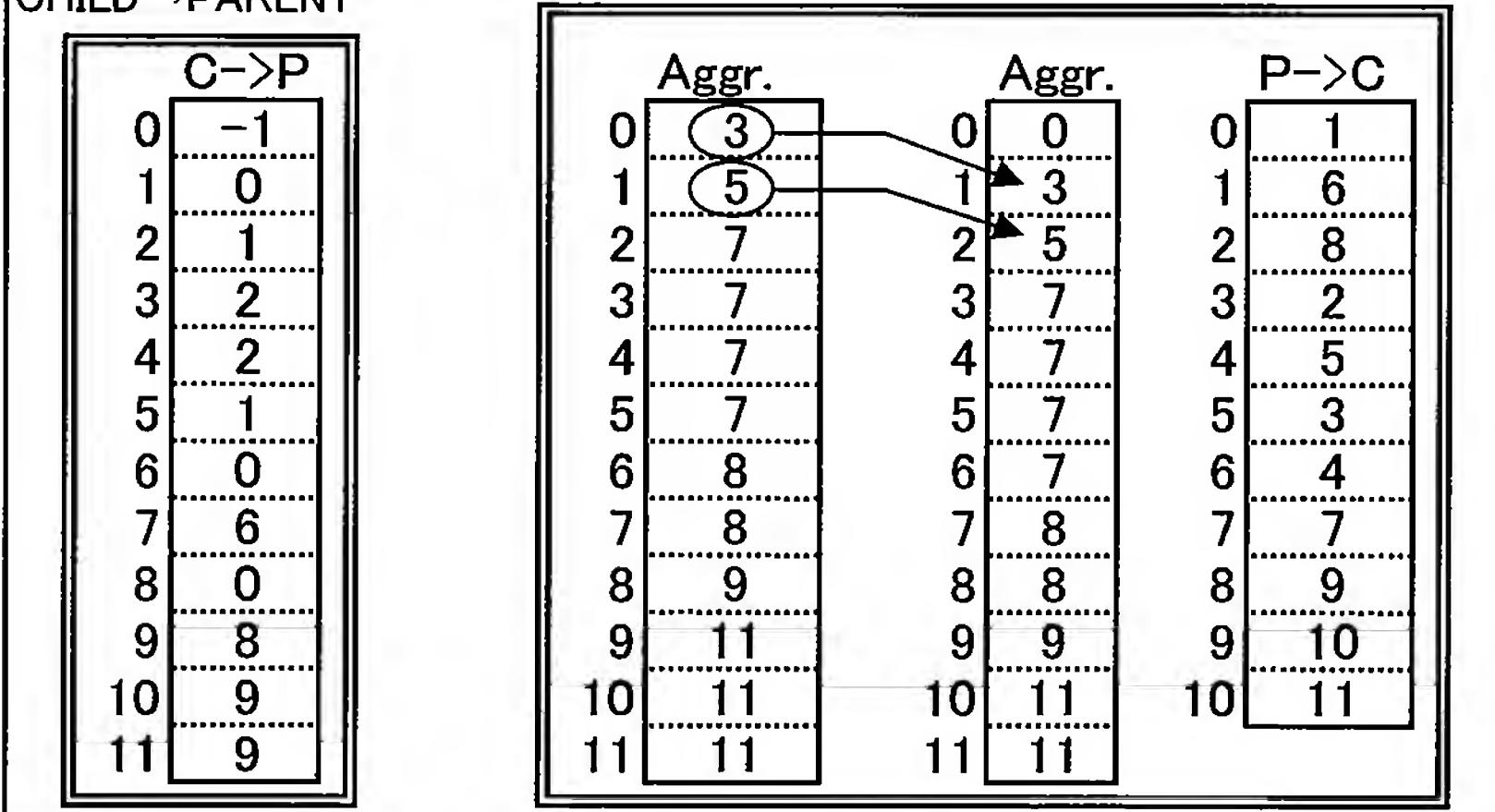


Fig.47C

CONVERSION RESULT

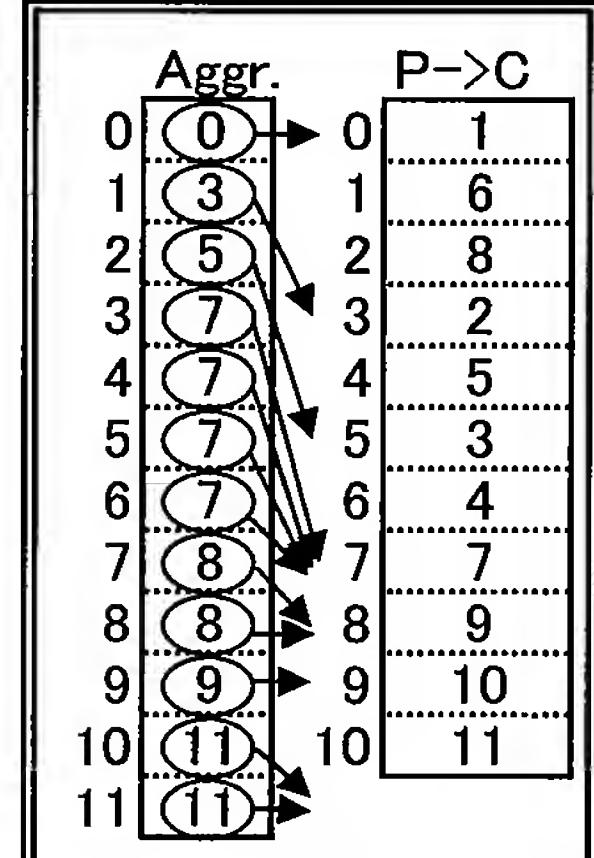
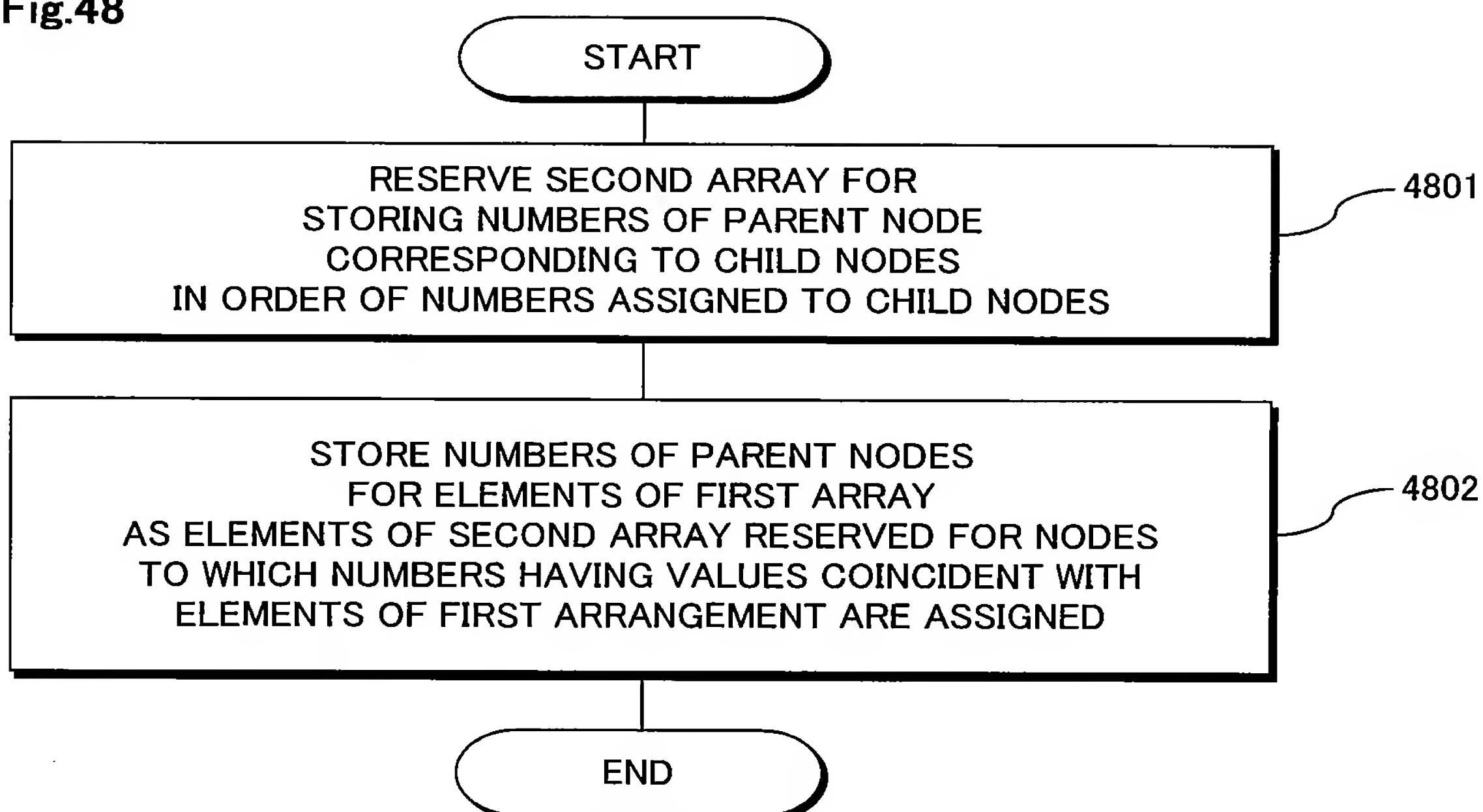


Fig.48



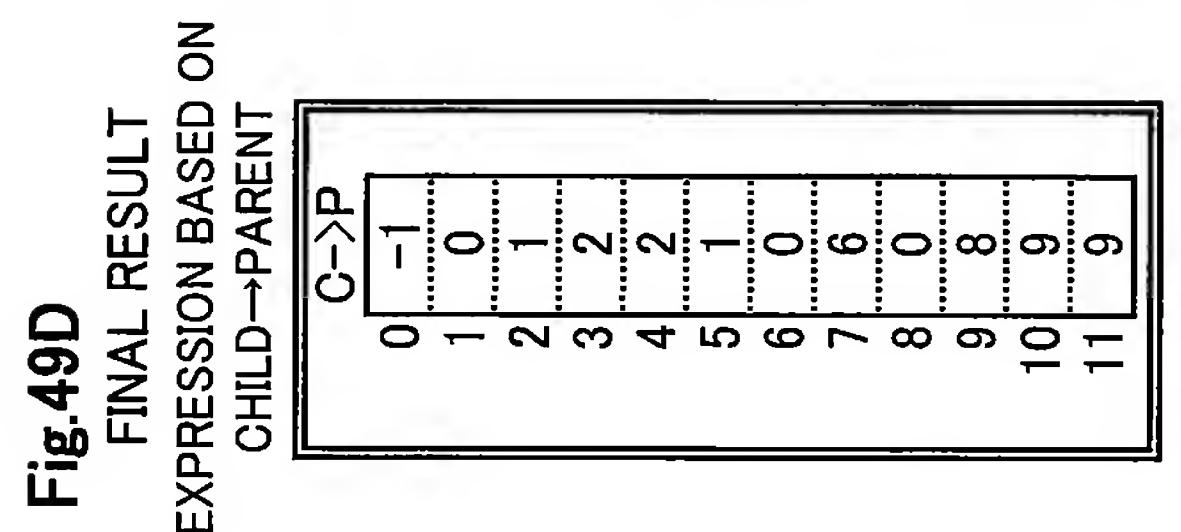
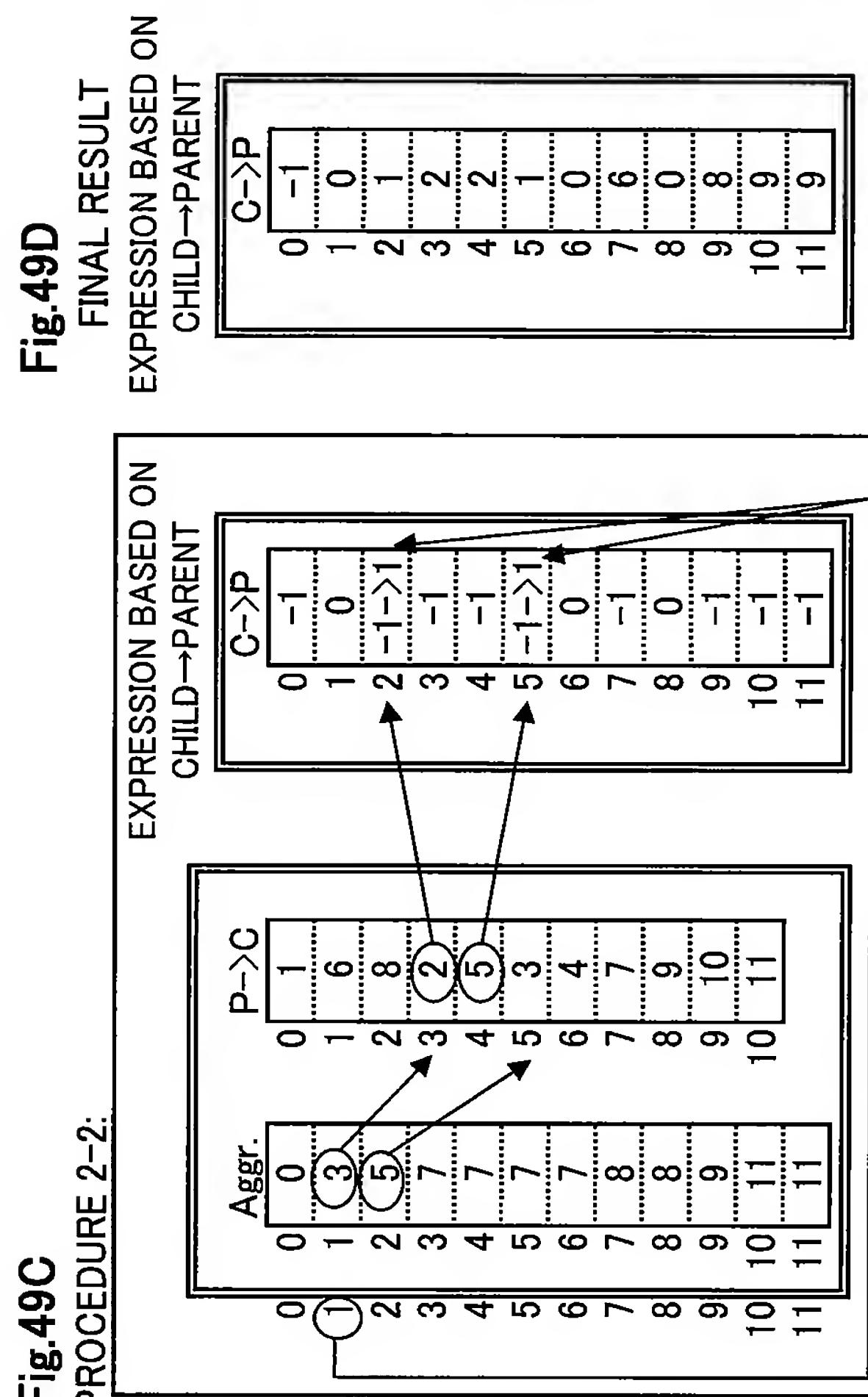
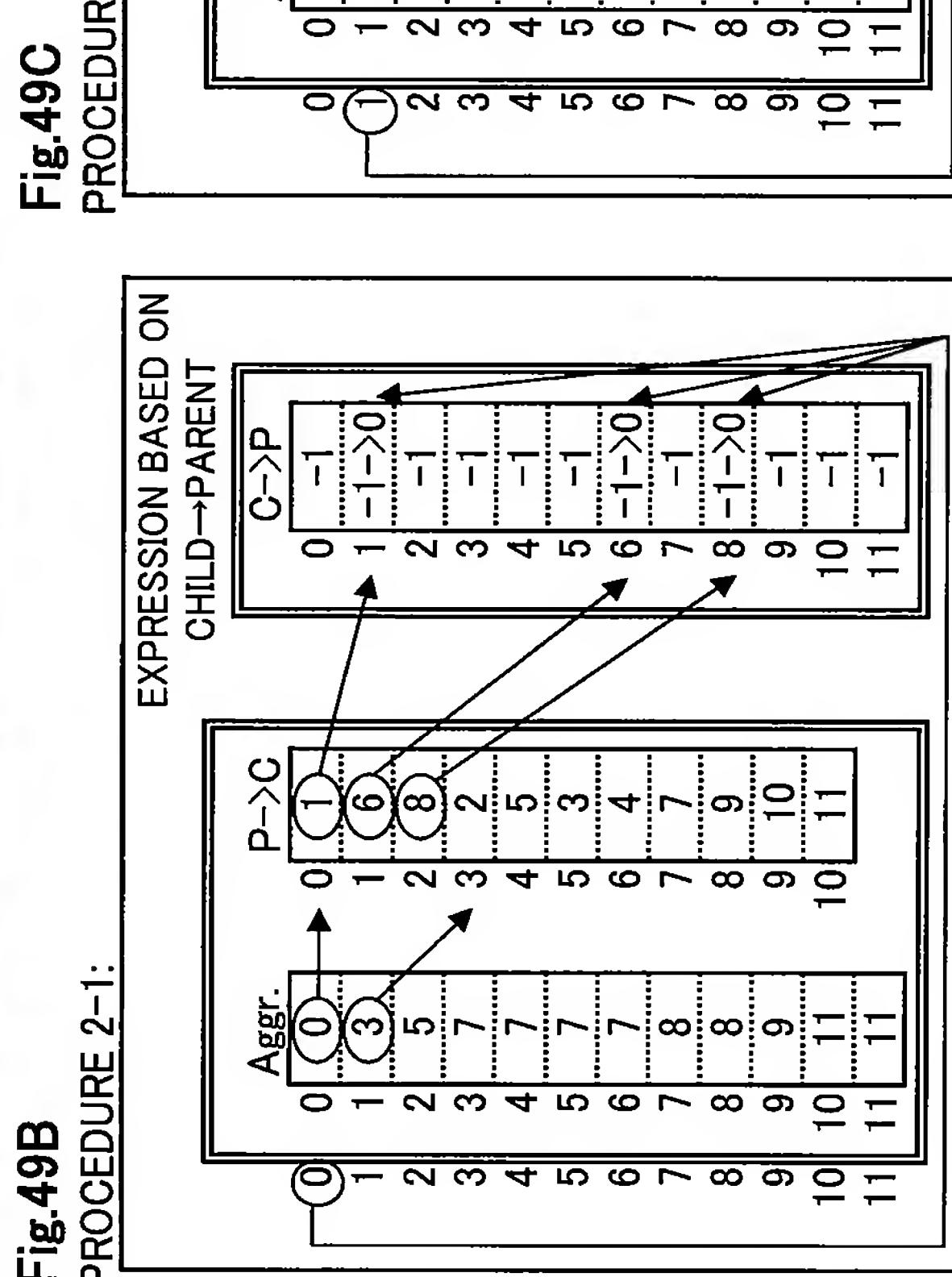
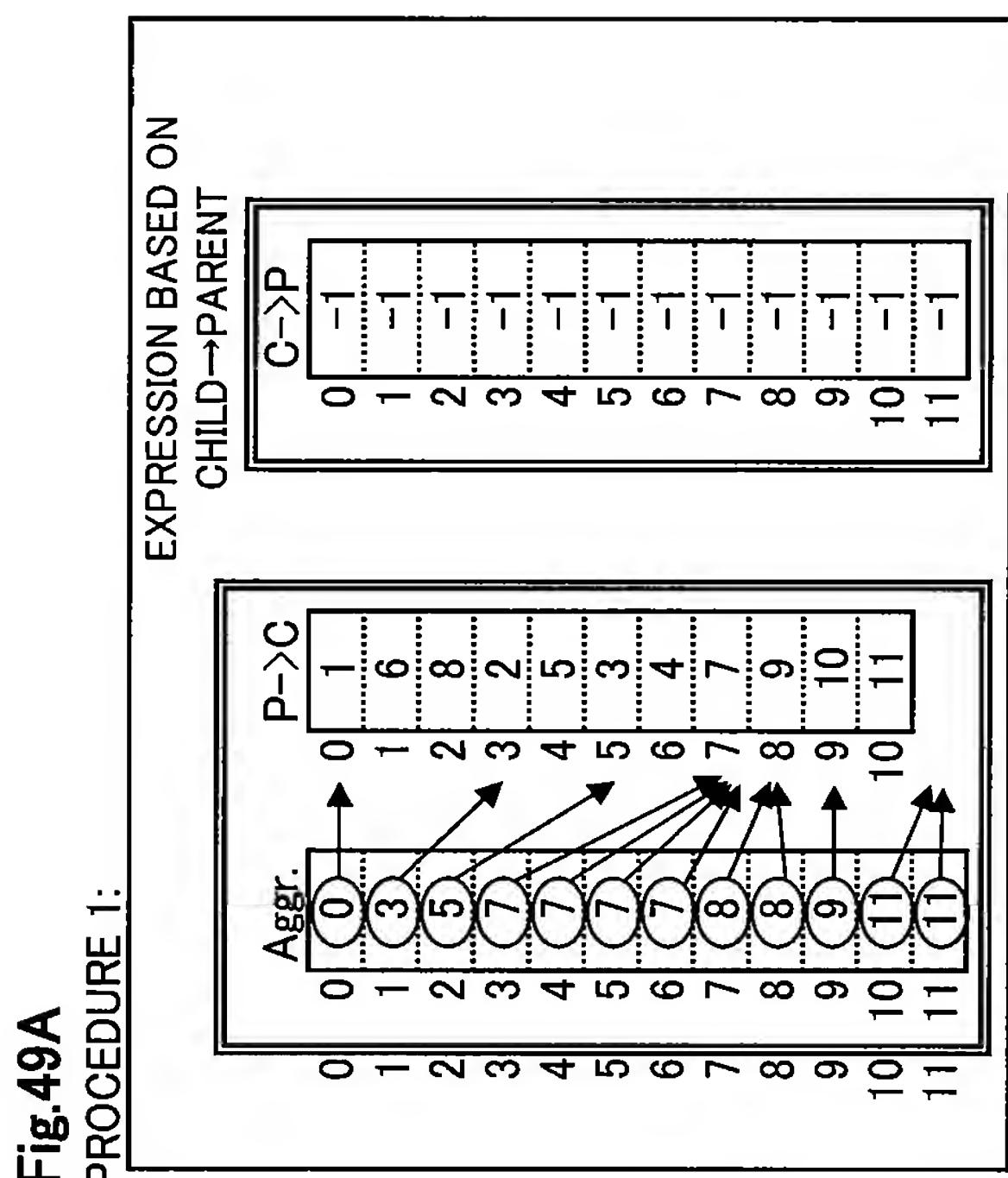


Fig.50

